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## ON THE IMPROVEMENT OF OUR BREED OF HORNED CATTLE BY IMPORTATION.

We are induced to say something on this subject, not only because we think it an important one, but because some very able and interesting remarks have been made upon it by the venerable President of the Essex Agricultural Society.

In the course of his remarks and quotations, he has been pleased to refer to the editors of this journal, or at least to one of them, and he has cited passages, which might lead readers to infer that we entertain the opinion, that little benefit will be derived from importing the improved races of Great Britain (at least such might be the inference drawn from them). It is probable, also, that most persons who may read the essays of Col. Pickering, will believe that he is of opinion, that these importations of foreign stock are of little importance, and of course, that the attempt to cross the imported animals with our own stock, is nearly useless labour and expense.

Such is the general effect of the remarks, and such we think will be the impression, and as his weight of character and great opportunities both of reading the most approved books on this topic, and of seeing various descrip-

tions of cattle in all parts of the United States, justly entitle him to a great share of public confidence, we think it a duty we owe to the public to state our own views upon the subject. We are not opposed to what we believe to be Col. Pickering's opinions. We coincide with him in the greater part of them, but we think the tendency of his essays is to discourage the attempt to improve our own breeds by foreign crosses, and this *tendency* we regret, and shall give our reasons for regretting it.

We begin then by saying, that we presume our ancestors very early ceased the importation of cattle from England. The ships were small, crowded with passengers and their effects; the passages long, the transport expensive, and we assume it as probable, that few cattle, if any, were imported after 1650.

It is well known, that the agriculture of England was then in a low state compared with its present condition. Successions of crops were nearly unknown; root crops for winter fodder were, we believe, entirely so. The prices of cattle were small, no great encouragement had been given to improve the breed. It is probable, therefore, that the cattle imported were not of a very improved race.

On the other hand, there can be no doubt, that our climate and pastures are well adapted to the preservation of cattle in as good a state as when imported, and rather to improve them. This we infer from the *fact*, that they are so fine, rather than from any general reasoning derived from our climate and soil, and still less from our treatment of them. If we regarded those only, we should say, that the heat of our summers, and length and severity of our winters, were unfavourable to an animal impatient of great heat and severe cold, and thriving much better on green succulent food than on dry meadow hay. In a short excursion made this spring into the country, we found the cows turned out to very short pastures, (on the 18th of May) thin, feeble and

in every respect miserable. We speak of the great mass of them: and we understand the common practice to be, to feed the cows on meadow hay, reserving the more substantial food for their working cattle and horses.

Now it does not seem to us possible, that we can have materially improved our horned cattle since we imported them; that we have preserved them so perfect as they are in Vermont, in Hampshire and Worcester counties of Massachusetts, is rather a matter of some surprise, proving we think clearly, that a little more care in providing against the cold of winter, and its impoverishing diet, would enable us to surpass Great Britain in this important article of husbandry.

As the agriculture of Great Britain has gone on daily and regularly in an improving course, ever since the middle of the seventeenth century, and more especially since the middle of the last century, while our's has continued stationary or even retrograde, till within the last 50 years, it would naturally be expected that their race of horned cattle would gradually improve, and more especially since their opulent farmers have devoted their attention to their improvement. The spirit of rivalship, the great prices paid for more than 50 years for fine bulls and cows must have had this effect.

Let us take an example which is more easily examined, because it is much more obvious, their races of sheep. Surely it will not be questioned, that the Dishley or New Leicester race of sheep, are far superior to any which we raise, (the merino an imported race alone excepted, on account of its fine fleece). We have no good race of native sheep, and we have no sheep to compare with those of Great Britain. Why is this so? Possibly because the perpetual verdure of England is more favourable to the propagation of sheep; but we think that it is principally owing to neglect on our part.

The same thing is true with respect to swine. The Bed-

ford, a spotted race, first introduced into Massachusetts by Col. Pickering, is far superior to any one which we before possessed. Since the introduction of these, there have been other breeds introduced, which, so far as we can judge by description and by prints, are the race called in England the Berkshire, or perhaps crossed with the Chinese, which for aptitude for fattening, and for profit, are far superior to our old, long-legged race, who consumed the farmer as well as the fruits of his industry.

We believe, and we believe because we have seen, that the horned cattle of Great Britain are as a whole body, superior to our own. If Col. Pickering should pass a six week's tour in England, he would feel as we do, that it is not a question to be discussed, but a point settled. Twenty-two years since we spent a twelve-month in that country. We shall say nothing of the shows of cattle at the Smithfield club celebration, nothing of the Lewes show of cattle. We admit, that when Dukes, and Marquises, with incomes of 500,000 dollars, are patrons and competitors, animals may be produced of *any* form, and of *any* reasonable dimensions. Money and care will put flesh in any quantity, and in the most profitable parts of any animal of good form. We shall therefore omit any reference to their cattle shows as compared with our own. Any picture of them (however true in itself) would appear to be as exaggerated, as an attempt to give an idea of the confluence of passengers, and the extent and vastness of London would be to an inhabitant of the thriving town of Worcester. It is not a thing to be described. It can only be half understood by seeing it, for the mind is so bewildered and lost, that it loses at least half its powers of perception.

We say nothing, therefore, of the professed exhibitions of rare animals, but this we do say, that when we travel through England, we find ourselves among a race of improved horned cattle, nearly every one of which we *covet*. Let Mr. Marshall or Mr. Young (old writers) say what they

will, nothing can destroy the effect of ocular demonstration. The cattle of England are far superior to our own, as a body, and it is not precisely correct to compare individual exceptions in our country with general and average statements of whole counties in England. We are sorry to say further, that the cattle of the low countries and of Normandy, appeared to us much finer than our own, in a visit made to these counties eight years since. They were in better condition, and much fewer miserable individuals among them. They had learned the important lesson, that a poor animal is not worthy of its support. We have always thought with Col. Pickering, that our country possesses at this moment, a race of cows, and possibly of bulls, which selected with care, their progeny raised, and kept from contamination with inferior animals, for five or six generations, would produce a race of cattle which we might shew with pride at Smithfield. But who are our capitalists that will select and take due care of them? Where is the man who has so cautiously guarded the progeny of a fine cow? and if he did, unless he should raise her bull calves as husbands, how can he hope to keep the race pure?

Would there be any question in the mind of any sensible cultivator about to raise his own stock, that if a neighbour had improved his own race so that they were eminently fitted for the various uses of this most important agricultural animal for milk, for beef, and for draught, that it would be for his interest to procure that stock, and to sell off his own miserable breed? We trust not. Well, then, another nation has done this for us. She offers you the effect of 50 years experiment. Will you refuse it? We hope not.

The Massachusetts Agricultural Society offered a premium for the importation of the best races of Great Britain. They came. The premiums were awarded. The public admired the animals. The public may have been deceiv-

ed: they may have been carried away by the novelty. Still they lingered, and looked, and crowded round these imported animals. They thought that they were superior to any of their own. Experienced farmers, herdsmen, butchers, so pronounced them; they awarded the premiums. Still this may all be infatuation, the mere love of novelty. They produced calves: the calves were better formed, grew faster, had flesh on more valuable parts, had better hair, and "*finer feel*," indicating a disposition to fatten; they weighed more on the same keeping. Was all this illusion? We think not. We say we *think* not; we add, we know it is not *all illusion*. We know it to be founded on good and substantial grounds. We had some excellent cows of native race which we had carefully kept through three successive generations, and we have been amply rewarded for it. We have recently crossed them with the foreign breeds; the calves were manifestly superior. Not having a large farm, we parted with the calves to our friends, and recently upon inquiry of a friend who had two of our calves, and had a stock of eleven cows, we found the two highest as to milkers, were of this mixed race.

We have now two cows of the mixed race, one out of Fill Pail, and one out of Mr. Parsons' Holderness, and they are much superior to any cows we have been able to purchase for 20 years. We are now raising calves of the half blood to supply the cows which are now getting aged. One advantage they certainly have; they keep their flesh better without diminishing their milk. Still there are native cows, a very few, as good, and some better.

We now proceed to the most important consideration in relation to these imported animals.

Their calves sell better; they are more carefully watched; they have introduced a habit of attention to stock; they excite a spirit of rivalry, and one of the most valuable and important effects of the late interesting letters of Col.

Pickering will probably be to induce our farmers to endeavour to compete with and surpass the imported breeds.

While Col. Jaques, the most successful and the most intelligent of our breeders, who under great disadvantages of location, seems to rival the celebrated Bakewell in his skill and attention can sell his pure breed, as he has done this spring at 300 dollars for an eight month's bull calf, there can be no doubt that the experiment will be fairly tried. As Col. Pickering does not seem to believe that any serious evil has resulted from the importation of a *worse stock*, we think we may safely encourage the crosses of this race with our own, keeping in mind as we ought to do, as he wisely suggests, that far the most ready and rapid way to improve our stock, is to select and raise only the best of our own breed. As this subject has taken deep hold on the public interest, we think we cannot more profitably for the readers of this journal occupy the public attention, than by copious extracts from the Complete Grazier, the latest work on the subject. We shall extend our extracts to every species of live stock.

### DEVONSHIRE BREED.

This breed is descended from the wild race.

Its *specific characters* are:—Horns of a middle length, bending upwards; colour light red, with a light dun ring round the eye; thin face; hips wide; and thin skin. This breed of cattle is most admirably calculated for draught: though rather small in point of size, they amply compensate for that defect by their hardiness and agility. They fatten early. The Devonshire breed derives its name from the county where the cattle are chiefly bred. The figure above delineated, is from an ox belonging to Lord Somerville, and exhibited at his show of cattle, in 1806.

Of this race there are two varieties: 1. The Herefordshire, and 2. The Sussex. Their colour is red; hair fine; thin skin; horns of a medium length, rather curving up-

wards; head and neck clean; hips, rump, and sirloin wide; thin thighs; back straight; chine narrow; small boned. The animal above delineated has been drawn from a prize ox of that spirited grazier, Mr. Westcar. These two varieties are, in every respect, similar to the parent race:—The cows yield a good portion of rich milk. The Sussex and Hereford breeds occur particularly in the counties whence they are denominated; also in Kent, and various other parts of England.

### DUTCH, OR SHORT-HORNED BREED.

*Specific characters.*—Hides thin; horns short; little hair; colour red and white, nearly equally mixed; tender constitutions. They possess, however, the valuable property of fattening kindly, and yielding large quantities both of milk and of tallow. The principal resort of this breed is in the eastern counties of England, as well as in some of those in North Britain, which border on the German Ocean.

### LANCASHIRE BREED.

*Specific characters.*—Long horned; hides firm and thick; hair long and close; necks thick and coarse; colours various, with a white streak along the back; hoofs large; fore quarters deeply made; hind quarters lighter than those of other breeds. Constitution hardy. Milk less in point of quantity, but the cream is of a richer quality than that of other species of neat cattle. The long-horned cattle are principally reared in Lancashire, Leicestershire, Warwickshire, and the chief grazing counties.

Of this breed there is a variety, known by the name of Dishley, which is descended from that kind selected, improved, and recommended by the late Mr. Bakewell. This variety is in great request in various parts of England: its *specific characters* correspond, in a very great degree, with those of the parent stock; but the leg bones are fine, small, and clean; and the hides are thin. The Dishley neat cat-

tle fatten kindly and in a little time, upon the most valuable points, though yielding but little milk for the dairy, and producing little tallow.

### GALLOWAY, OR POLLED.

This breed derives its name from the county of Galloway, where, and also in some parts of the Lowlands of Scotland, the cattle are chiefly reared; and whence vast numbers are annually sent to Norfolk, and other English counties, to be fattened for the markets. In general they are without horns, though a few beasts sometimes have two small excrescences depending from the parts where horns usually grow, in colour and shape resembling the long-horned race, though somewhat shorter; hides moderately thick. The Galloway is a most excellent and hardy breed, fattening kindly on the best parts; the flesh is fine grained and well mixed with fat; the oxen are well calculated for draught.

Of this breed also there is a variety, termed the SUFFOLK DUNS: they are polled, or without horns; small sized, very lean, and big-bellied; colour, a light dun. Suffolk and the adjoining counties contain the largest number of this variety, which is excellently calculated for the dairy, and yields abundance of rich milk.

### ALDERNEY, OR FRENCH BREED.

*Specific characters.*—Small sized; colour light red or yellow; horns smooth and neat; of tender constitutions. This breed occurs principally in the south of England, in the possession of gentlemen. The Alderney cows are very rich milkers; their flesh is high coloured, fine grained, and of excellent flavour.

## SHEEP WITHOUT HORNS.

### DISHLEY, OR NEW LEICESTER BREED.

*Specific characters.*—Heads clean, straight, and broad; bodies round, or barrel shaped; eyes fine and lively; bones fine and small; pelts thin; wool long and fine, well calculated for combing, and weighing, upon an average, eight pounds per fleece, when killed at two years old. Fatten kindly and early, being admirably calculated for the market, thriving on pastures that will scarcely keep other sheep, and requiring less food than others. Tolerably hardy and vigorous.

The Dishley sheep are found chiefly in Leicestershire and the neighbouring counties, whence this breed is gradually dispersing through the kingdom.

### LINCOLNSHIRE.

*Specific characters.*—Faces white; bones large; legs white, thick, and rough; carcases long, thin, and weak; wool fine and long, from ten to eighteen inches, weighing per fleece, when killed at three years, an average of about eleven pounds. Flesh coarse grained. Slow feeders, calculated only for the richest pastures. Constitutions tender. As its name implies, this breed occurs principally in Lincolnshire, and other rich grazing districts.

### *Variety* 1. TEESWATER BREED.

*Specific characters.*—Bones finer; legs longer; carcase more heavy and firm; back and sides wider than in the original breed; wool not so long as that of the preceding sort, weighing about nine pounds per fleece, when killed at two years old. Flesh finer grained, and fatter than the parent stock. Females singularly prolific, generally producing two, and often three, lambs each. Constitution

weak. Slow feeders, suited only for the finest pastures, consequently less profitable than the smaller sized, but quicker feeding sorts of sheep. Capable of great improvement, by crossing with new Leicester, or Dishley rams.

This race is bred chiefly in the extensive, fertile, sheltered, and inclosed tracts of pasture watered by the river Tees, in Yorkshire.

*Variety* 2. COTSWOLD, OR IMPROVED GLOUCESTER BREED.

*Specific characters.*—In most respects resembling the parent breed, but superior. They are chiefly found in Gloucestershire. The wool is not so long as that of the original sort. The mutton is fine grained and full sized, and the breed is capable of great improvement by proper crossing.

DARTMOOR, OR DEVONSHIRE NATTS.

*Specific characters.*—Faces and legs white; necks thick; bones large; backs narrow, but back bone high; sides good.

This race is principally confined to the moor, in the county of Devon, whence the sheep derive their name. The wool is long, weighing upon an average, nine pounds, when killed at about two years and a half. This breed improves materially by crossing with the Dishley breed.

HEREFORDSHIRE, OR RYELANDS.

*Specific characters.*—Faces and legs white; size small; carcase well shaped; wool very fine and short, growing close to their eyes, and weighing, when killed at four years and a half, upon an average, two pounds per fleece. Patient of hunger. Flesh fine grained. Constitution tender, so as to require to be sheltered in winter. Very profitable, no breed being supposed capable of subsisting on so small a quantity of pasture as this sort requires.

### SOUTH DOWN.

*Specific characters.*—Faces and legs grey; bones fine; neck long and small; low before; shoulder high; light in the fore quarter; sides broad; loin tolerably good; back bone rather too high; thigh full; and twist good; wool very fine and short, (the staple being from two to three inches in length,) weighing an average of two pounds and a half per fleece, when killed at two years old. Flesh fine grained, and of excellent flavour. Quick feeders. Constitution hardy and vigorous. Capable of great improvement. The South Down sheep are principally bred on the dry, chalky downs of Sussex, whence this valuable breed is gradually being introduced into various districts.

## SWINE.

### BERKSHIRE BREED.

*Specific characters, &c.*—Colour reddish, with brown or black spots; sides very broad; short legs; ears large, and pendant over the eyes; body thick, close, and well made. Kindly disposed to fatten, and attaining a large size, but can be kept only where a large and constant supply of food can be procured, otherwise they will dwindle away, and yield no profit. Flesh fine.

### CHINESE, OR BLACK BREED.

*Specific characters, &c.*—Colour mostly black, though sometimes white, tawny or reddish, and brown; size small; neck thick; legs short; body thick, close, and well made. One of the most profitable sorts in this island; flesh delicate; fatten kindly on very indifferent food; but very mischievous if not well ringed.

### GLOUCESTER.

*Specific characters, &c.*—Colour white; size large; legs long, having two wattles or dugs pendant from the throat; carcase long and thin; skin thinner than that of the Berkshire sort; ill formed. A very unprofitable sort; found chiefly in Gloucestershire, Shropshire, and West Devon; supposed to have formerly been the only breed in Britain. Do not fatten so well, or so kindly, as the Berkshire breed.

### HAMPSHIRE.

*Specific characters, &c.*—Colour chiefly white; neck and carcase long; body not so well formed as the Berkshire pigs; size large. Fatten kindly, and to a very great size and weight.

### HIGHLAND, OR IRISH BREED.

*Specific characters, &c.*—Size small; bristles erect; ill shaped. Thrive very badly; prevailing chiefly in the Highlands.

### NORTHAMPTON BREED.

*Specific characters, &c.*—Colour white; legs very short; ears enormously large, often sweeping the ground; size large. Fatten to a large size, but not very kindly; reared chiefly in the county of Northampton.

The SHROPSHIRE BREED appears to be a variety of the Northampton race, to whose characteristics it bears a great resemblance. The Shropshire swine fatten to a large size, but are not so kindly disposed as the Berkshire.

### THE RUDGWICK BREED

Is a peculiar sort of swine, reared at a village of the same name, on the confines of Surry and Sussex. These swine are very valuable, as they fatten kindly and to a

vast size, weighing, at two years, twice or thrice the weight of other swine at that age.

### SWING-TAILED BREED.

The colour of this breed is various; its size small, but well proportioned. They are hardy, and fatten to a great weight.

### LARGE, SPOTTED WOBURN BREED.

This is a new variety, introduced by the late Duke of Bedford; its size is large, and colour various. These swine are well formed, very prolific, hardy, kindly disposed to fatten, attaining nearly twice the size and weight of other hogs within the same given period of time.

## GENERAL OBSERVATIONS ON BUYING AND STOCKING A FARM WITH CATTLE.

"The benefit," observes that enlightened agriculturist, Mr. Young,* "to be derived from the occupation of land, depends so much on the farmer commanding the requisite capital, that it is extremely necessary for the young beginner to be well advised on this essential point." Assuming it therefore as certain, that such a beginner is provided with that indispensable requisite, we shall proceed to state a few general hints on the buying and stocking of his farm with cattle; and shall introduce, under the respective accounts of rearing and breeding the different species, such remarks on their various merits and demerits as will materially assist him in the course of his labours.

The first object of attention, then, is to consider the proportion between his stock and the quantity of feed which will be necessary to support them. The nature, situation, and fertility of the soils that compose his farm are equally worthy of notice, as well as the purpose for which he designs more particularly to rear or feed his cattle; whether

* Farmer's Calendar, Ed. of 1804, p. 481.

for the pail, or with the view of supplying the markets. In fact, it will be expedient to observe the greatest exactness in this proportion, because, in case he should overstock his land, his loss will be certain and great; while, on the other hand, he will incur a diminution in his profit, if he should not stock his land with as many cattle as it will bear.

Formerly, a great prejudice prevailed in favour of big-boned, large beasts, but it has been ascertained, that this breed is, in point of profit, much inferior to the middle-sized kind; and, by a careful attention to the selection of stock, no inconsiderable progress may be made towards the improvement of the different species. Among the various professional breeders of modern times, few have attained greater celebrity than the late Mr. Bakewell, of Dishley, to whom we are indebted for many new and important improvements in the science of rearing cattle. The principle which he invariably adopted was, to select the best beast, that would weigh most in the valuable joints; so that, while he gained in point of shape, he also acquired a more hardy breed; and, especially by attending to the *kindliness* of their skin, he became possessed of a race which was more easily fed and fattened than any other.

Till within a few years, the invariable practice was to judge by the *eye* only, without regarding the other qualities of the animal intended to be purchased; but, in the present improved age, a more rational mode of forming the judgment is adopted. The sense of touch is now brought in aid of the sight; and, by repeated practice, the art of judging of the kindliness to fatten has been brought to such perfection, that any well-informed breeder, who has *personal* experience can, on examining lean beasts, tell, almost instantaneously, in what points or parts they will or will not fatten.

In the selection, therefore, of live stock in general, the young farmer will find it necessary attentively to consider the following particulars:

I. *Beauty, or symmetry of shape;* in which the form is so compact, that every part of the animal bears an exact consistency, while the carcase should be deep and broad, and the less valuable parts (such as the head bones, &c.) ought to be as small as possible.* For working cattle more particularly, Mr. Marshall states the following proportions as being essentially necessary, viz. That the neck be thin and clean, to lighten the fore-end as well as to lessen the collar, and make it sit close and easily on the animal while employed in draught. The carcase should be large, the bosom broad, and chest deep; the ribs standing out from the spine, both to give strength of frame and constitution, and likewise to admit of the intestines being lodged within the ribs. Further, the shoulders ought not only to be light of bone and rounded off at the lower point, that the collar may sit easily, but also broad, to impart strength; and well covered with flesh, that the animal may draw with greater ease, as well as to furnish a desired point of fattening cattle. The back also ought to be wide and level throughout; the quarters long, the thighs thin, and narrow at the round bone. The legs ought, below the knee and hock, to be straight, and of a moderate length; light boned; clean from fleshiness, yet having joints and sinews of a moderate size, for the united purposes of strength and activity. In these points all intelligent breeders concur; but, as beauty of shape too often depends on the caprice of fashion, it is more requisite to regard,

II. *Utility of form*, or that nice proportion of the parts to which Mr. Bakewell bestowed so much attention, and which has already been noticed.

III. The *flesh*, or texture of the muscular parts; a quality which was formerly noticed only by butchers, but the knowledge of which the enlightened farmers or breeders of the present day, have not blushed to acquire from

* Sir John Sinclair's "Hints regarding Cattle," in the Farmer's Magazine, vol. iii. p. 154.

them: although this quality necessarily varies according to the age and size of cattle, yet it may be greatly regulated by attention to the food employed for fattening them. As a knowledge of this requisite can only be acquired by practice, it is sufficient to state, that the best sign of good flesh is that of being *marbled*, or having the fat and lean finely veined, or intermixed, when the animals are killed; and, while alive, by a firm and mellow feel.

IV. In rearing live stock of any description, it should be an invariable rule to breed from small-boned, straight-backed, healthy, clean, kindly-skinned,* round-bodied, and barrel-shaped animals, with clean necks and throats, and little or no dewlap; carefully rejecting all those which may have heavy legs and *roach* backs, together with much appearance of offal. And, as some breeds have a tendency to generate great quantities of fat on certain parts of the body, while in others it is more mixed with the flesh of every part of the animal, this circumstance will claim the attention of the breeder as he advances in business.

V. In the purchasing of cattle, whether in a lean or fat state, the farmer should on no account buy beasts out of richer or better grounds than those into which he intends to turn them; for, in this case he must inevitably sustain a very material loss, by the cattle not thriving, particularly if they be old. It will, therefore, be adviseable to select them, either from stock feeding in the neighbourhood, or from such breeds as are best adapted to the nature and situation of the soil.

VI. *Docility of disposition*, without being deficient in spirit, is of equal moment; for, independently of the damage committed by cattle of wild tempers on fences, fields,

* As this word may probably often appear in the course of the subsequent pages, it may not be altogether irrelevant to state, that it implies a skin which feels *mellow*, i. e. soft, yet firm to the touch, and which is equally distant to the hard, dry skin, peculiar to some cattle, as it is from the loose and flabby feel of others.

&c. which inconvenience will thus be obviated; it is an indisputable fact, that *tame beasts require less food to rear, support, and fatten them*, consequently every attention ought to be paid, early to accustom them to be docile and familiar.

VII. *Hardiness of constitution*, particularly in bleak and exposed districts, is indeed a most important requisite; and, in every case, it is highly essential to a farmer's interest to have a breed that is liable neither to disease nor to any hereditary distemper. A dark colour, and in cattle which are kept out all the winter, a rough and curled *pile* or coat of hair, are, in the popular estimation, certain indications of hardiness; but it is obvious to every thinking person, that this quality, though in some respects inherent in particular breeds, depends, in a great measure, upon the method in which cattle are treated.

VIII. Connected with hardiness of constitution is *early maturity*, which, however, can only be attained by feeding cattle in such a manner as to keep them constantly in a growing state. By an observance of this principle, it has been found that beasts and sheep, thus managed, *thrive more in three years*, than they usually do in *five*, when they have not sufficient food during the winter, by which, in the common mode of rearing, their growth is checked.

IX. A *kindly disposition* to take fat on the most valuable parts of the carcase, at an early age, and with little food, when compared with the quantity and quality consumed in less fertile situations, by which means the supply will be greater for the consumer. On this account, smaller cattle are recommended by C. G. Grey, Esq. ("Letters and Papers of the Bath and West of England Society," vol. x. p. 262,) as generally having a more natural disposition to fatten, and as requiring, proportionably to the larger animal, less food to make them fat; consequently, the greater quantity of meat for consumption can be made per acre. "In stall feeding," the nature, method, and advantages of which

will be stated in a subsequent chapter,* he remarks that, "whatever may be the food, the smaller animal pays most for that food. In dry lands, the smaller animal is always sufficiently heavy for treading; in wet lands less injurious." And as to milk, he is decisively of opinion, that the smaller animal produces more goods for the food she consumes, than those of a larger size.

X. *The hide* of cattle is also worthy of notice; as, by the simple touch, both butchers and graziers are enabled to judge of their disposition to fatten. Sir John Sinclair has justly remarked,† that, "when the hide or skin feels soft or silky, it strongly indicates a tendency in the animal to take on meat; and it is evident, that a fine and soft skin must be more pliable, and more easily stretched out to receive any extraordinary quantity of flesh than a thick or tough one. At the same time, thick hides are of great importance in various manufactures. Indeed, they are necessary in cold countries, where cattle are much exposed to the inclemency of the seasons; and, in the best breeds of Highland cattle, the skin is thick in proportion to their size, without being so tough as to be prejudicial to their capacity of fattening."

XI. *Working*, or an aptitude for labour: a point of infinite importance in a country whose population is so extensive as that of Britain, and where the consumption of grain by horses has so material an influence on the comforts and existence of the inhabitants. As, however, there is a difference of opinion on this subject, the reader is referred to the fifth section of this chapter, where the question is fully discussed.

XII. Whether kine be purchased for the plough, or for the purpose of fattening, in addition to the essentials already stated, it will be necessary to see that they are young, in perfect health, full mouthed, and not broken either in tail, hair, or pizzle; that the hair *stare* not, and

* Chap. III. Sect. II. † "Hints regarding Cattle," p. 157, &c.

that they are not hide-bound, otherwise they will not feed kindly. The same remark is applicable to cows intended for the pail, the horns of which should be fair and smooth, the forehead broad and smooth, udders white, yet not fleshy, but thin and loose when empty, to hold the greater quantity of milk, but large when full; provided with large dug-veins to fill it, and with four long elastic teats, in order that the milk may be more easily drawn off.

XIII. *Age.*—Beside the rules above stated, there are some particulars with regard to the age of neat or black cattle and sheep, which will merit the farmer's consideration.

"Sheep, in general, renew their first two teeth from fourteen to sixteen months old, and afterwards every year, about the same time, until they are turned three years old, or rather *three shear*, to speak technically, when they become full-mouthed; for, though they have eight teeth in the under jaw before, I believe they only cast or renew the six inside ones."* But, with regard to this point, there is a difference of opinion among experienced shepherds, some of whom conceive that they cast only six, while others think that they renew the whole eight fore-teeth.

"Neat cattle cast no teeth until turned two years old, when they get two new teeth; at three they get two more; and in every succeeding year get two, until five years old, when they are called *full-mouthed*, though they are not properly full-mouthed until six years old, because the two corner teeth, which are last in renewing, are not perfectly up until they are six."†

The horns of neat cattle also supply another criterion by which the judgment may be assisted, after the signs afforded by the teeth become uncertain. When three years old, their horns are smooth and handsome; after which period there appears a circle, or wrinkle, which is annually

* Culley's "Observations on Live Stock," 8vo. 1801, p. 211.

† Cully on Live Stock, p. 208, 209.

increased as long as the horn remains; so that, according to the number of these circles or rings, the age of a beast may be ascertained with tolerable precision, unless such wrinkles are defaced, or artificially removed, by scraping or filing; a fraudulent practice, which is but too frequently adopted, in order to deceive the ignorant or inexperienced purchaser with respect to the real age of the animal.

*Complete Grazier.*

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## ON THE COMPARATIVE VALUE OF OXEN AND HORSES FOR AGRICULTURAL LABOURS.

This is a subject which has already occupied many pages of our Journal, but not in any degree in proportion to its vital importance. The increase of manufactures produces an increase of the use of horse labour, and threatens a change in our habits and usages—a change, which we think would be most disastrous. Whether the recent projects of canals, some of which we apprehend from what we know of this part of our country would be much better on paper than on terra firma, will effect any change in this respect, we cannot say, but this we must believe, that New-England, the whole of it, is deeply interested in prefering the ox to the horse, as an animal for labour. It is pretty well known that horses are chiefly employed in cultivation in England; but there have been always sensible men in that country, so crowded with population—so destitute of extensive pastures, and therefore less adapted to grazing, (except their sheep walks) who have in all ages protested against cultivation by horses.

Recently the question has been agitated in Maryland, with some zeal on both sides, and we have thought we could not render a more acceptable service to our readers, than by giving them the arguments of distinguished cultivators in England on this subject—not that they are new

to us, but the coincidence of opinion will have its deserved weight.

The principal argument of the advocates for cultivation by horses, in Maryland, seems to be the superior speed of the horse. Now this must proceed from an imperfect training of the cattle. With us, our cattle will plough an acre of ground much better, and in as short a time as a pair of horses would do it, unless they can trot their horses in the plough. So they will get in a ton of hay in as short a time. On this topic we beg to introduce some extracts from English and Scotch writers, where all the prejudices are in favour of horses.

"Few subjects have, of late years, more exercised the ingenuity of theorists, and the attention of farmers, than the question concerning the superiority of oxen to horses. The use of these animals, even under many impediments, has been persevered in for many ages, and will continue in every country where a breed of cattle exists which are active of themselves, and of a form and size well calculated for labour. And in the ancient law work, denominated *Fleta*, (which is supposed to have been written about the time of Henry I.) we have indubitable evidence, not only that oxen were then commonly used for the purposes of husbandry, but also of their superiority over horses. The author of that work states, first, that two oxen and two horses will plough as much in one day as four horses: secondly, that in heavy land, oxen made a stronger draught:* thirdly, that a horse requires the sixth part of a bushel of oats *per diem*, whereas, for a whole week, three one-half measures of oats (ten of which make a bushel) are sufficient for an ox: lastly, that an old horse is of no value, except for his skin; while an ox, after being past labour, will yield a good price when fattened.†

"Equally strenuous in favour of these animals is the au-

* Fleta, lib. ii. c. 73. s. 2. † Ibid. s. 3.

thor of the "Boke of Husbandry," Judge Fitzherbert, who lived in the time of Henry VIII. "It is to be known," says he, "whether is better, a plough of horses, or a plough of oxen, and therein meseemeth ought to be made a distinction. For in somme places a horse plough is better; that is to say, in every place: whereas the husbandman hath several pastures to put his oxen in, when they come fro their warke; there the ox-ploughe is better. For an oxe may not endure his warke, to labour all daye, and than to be put to the commons, or before the herdman, and to be sette in a foulde al nyghte without meate. But and he be put in a good pasture all nyghte, he will labour much of all the daye dayely.

"And oxen wyl plowe in tough clay and upon hylly ground, whereas horses wyl stand styll. And whereas is now suerall pastures, there the horse-plowe is better, for the horses may be teddered, or tyed, upon leys, balkes, or hades, whereas oxen may not be kept; and it is not used to tedder them, but in few places. And horses wyl go faster than oxen on even grounde or light grounde, and be quicker for carriage; but they be farre more costly to kepe in winter, for they must have bothe hey and corne to eate, and strawe for litter; they must be well shodde on all foure fete; and the gere that they shall drawe with is more costly than for the oxen, and shorter whyle it will last. And oxen wyll eat but straw and a lyttel hey, the whiche is not half the coste, that the horses must have, and they have no shoes as the horses have." [But the practice is now changed as to this point, and the shoeing of oxen, though essentially necessary, is infinitely cheaper than that required for horses.] "And if any sorance come to the horse, or waxe old, broysed, or blynde, than he is lyttle worthe; and if any sorance come to an oxe, or he waxe olde, broysed, or blynde, he will sell for ii s. and than he is manne's meate, and as good or better than ever he was. And the horse, when he dyeth, is but caryen. And there-

fore, meseemeth, all thinges considered, the ploughe of oxen is much more profitable than the ploughe of horses."*

For the length of this extract from the learned judge, (who was himself a practical husbandman, and consequently has here given the result of many years experience,) its excellence, we trust, will be a sufficient apology; as when taken in connexion with the account of Fleta, it will present a striking record, or document, of the superior utility of oxen over horses. In order, however, that this important subject may be placed in as clear a point of view as possible, we shall proceed to contrast the respective services of the two animals, supporting our remarks on *modern data*; though, probably, some of the preceding strictures may seem to render them unnecessary. And, when it is considered, that oxen, fit for grazing, are now of rare occurrence, it becomes daily a question of greater moment, particularly as it respects the supply of our navy.

I. *With regard to their original price, or cost.*

The prime cost of an ox, upon an average, is at least one half less than the price of a horse; hence it is obvious that an ox of the value of £. 7 or £. 8 will perform the same quantity of work as a horse worth £. 14 or £. 16. This is a circumstance of no small importance to a young farmer, to whom labouring cattle are the most expensive part of his stock, as he can thus be enabled to branch out his capital into various useful channels.

II. *With respect to labour.*

By well-known means the nature of the bull is tamed; and, when properly *broken*, the ox becomes as tractable, and may be trained to the plough or to draught as easily as horses. Of this we have numerous instances. Messrs. Culleys of the county of Northumberland, employ 150 oxen

* "Boke of Husbandry," p. 78. Edit. 1767.

in the draught, which practice they have followed, with great success, for more than thirty years. The animals are used singly in carts, and two in a plough, with cords, without a driver; and thus they perform their allotted work of ploughing, carrying corn, dung, &c. in all respects as well as two horses, though not with equal celerity. The late Lord Kaimes states,* that Colonel Pole, lately deceased, of Radburne, in Derbyshire, ploughed as much ground with *three* oxen, as his neighbours did with four or five horses; feeding them in summer with grass, and in winter with straw, when moderately worked, or, when much worked, with hay or turnips. The late Right Honourable Edmund Burke, at his ground near Beaconsfield, in the county of Bucks, ploughed one acre *per diem* with *four* oxen, while his neighbours performed the same work with an *equal number* of horses.

In ploughing and rolling, oxen are extremely useful. Horses are better in harrows, from their quick step, by which the pulverization of the soil is accelerated: in harvest likewise, when expedition is necessary, horses are preferable. In breaking up old turf-land, however, oxen are better in the plough, their motion being more steady than that of horses; the flag is less broken in turning over, which is a great advantage. For short carriages, as in carting dung, turnips, &c. the advantage of using oxen must be very great; and they may occasionally be used in the plough, when the horses are sent for lime, or to market.†

For the two following facts, which evince the superiority of oxen, even under circumstances unfavourable to these

* "The Gentleman Farmer," p. 30, 5th Edit. 1802; an interesting and practical work on husbandry, to which we are indebted for some of the following hints and facts.

† Sir John Sinclair's Account of the Systems of Husbandry in Scotland, vol. i. p. 123, which contains numerous important facts relative to the working of oxen.

animals, we are indebted to that enlightened agriculturist, Lord Somerville,* of whom we have already had occasion to make honourable mention.

At the last meeting, in 1803, of the Dublin Society, his lordship was informed, by a spectator of undoubted veracity, that several ploughs were entered for the prizes given; and, to the surprise of every one, the oxen beat the horses in speed; they were worked in pairs only, without drivers. These animals, he states, were not selected from the breeds most esteemed for labour, but from the oxen of that country.

Of the succeeding instance, Lord S. was himself an eye-witness.—In May, 1803, a meeting was held at Burnham Wyck, in the county of Essex, to award three prizes which were given for the best ploughing. Upwards of twenty ploughs started, three of which were each worked by three pair of oxen, without drivers. These animals were bred on the estate, and of a sort which are deemed by no means well adapted to labour; the horse-ploughs were *picked teams*. The difference of time in finishing the work allotted was, to the best of his lordship's remembrance, about twelve or fourteen minutes between the average of the horse and ox teams; so that, supposing them to be an hour and a half longer in their day's work, the difference in the time of rest will be, if any thing, in favour of the oxen; because animals which perspire by the tongue, do not require the dressing and attention demanded by those whose perspiration escapes by the skin.

The following is his lordship's method of working oxen: the animals are *broken in* at three years old, their first half-year's work being easy. At six years old they are sold to graziers, and in eight months they come to Smithfield good beef. In the intervening period his work is done at the rate of about eighty acres of tillage to four oxen; and his

* "Farmer's Magazine," vol. iv. p. 343.

twelve oxen, exclusive of the three-years old steers, will work thirty acres of land *per week*, when not employed in carrying lime or manure, which is ten acres per week for each four oxen, or five acres for each pair, that is, two acres *per diem* for four days in the week, for each team of four, allowing them two resting days. Thus their daily labour is completed in seven hours and a half, which gives them sixteen hours for rest. Lord S. remarks, that if they were allowed corn, they would probably do more work; and, if they did less, he would not employ them at all. He allows one horse for every 100 acres of land, for extra work, and no large number.

Lastly. Before we conclude the present contrast, as it respects *labour*, we would observe, that oxen are preferable to horses for *steady* draught, as they uniformly pull to their strength without variation; whereas the last-mentioned animals are apt to stop on encountering the slightest resistance. And though it is objected, that oxen are unfit for draught in mountainous situations, yet, let it be recollected, that under such circumstances no *draught can well be used;* and that the descending of steep hills is, in all respects, as dangerous to horses as to oxen. In addition to the facts already stated, it may be added, that notwithstanding oxen have less air and spirit than a horse, their motion is not materially slower; and as the labours of husbandry are regular and progressive, the step of these animals will be found little inferior to that of the horse. They are, indeed, reputed to be less expeditious for galloping or trotting; but repeated instances have occurred, where Sussex oxen have *beaten* horses at the plough in the deepest clay; and the Herefordshire breed is admitted to be superior to any other in long journeys, for conveying chalk, or other heavy substances, over a hilly and flinty country road. In the north of England, we understand that it is not an unfrequent occurrence, to see a light ox saddled, and briskly trotting along the road, obedient to his rider's voice: the

Devonshire cattle also walk with uncommon speed; and, if four or five horses can till 100 acres of land, the same work might doubtless be equally well performed by a similar number of the Devonshire or Herefordshire breeds, provided they were trained and fed with a special view to *speed*, with the same care as horses.

III. *Comparative expense of keep and general savings.*

| | |
|---|---|
| 1. Oxen are easily supported, during the severity of winter, on straw, turnips, and other vegetables of which a particular detail will be given, *infra*, Chapter III. Section II. Besides, as ruminating animals possess stronger digestive organs, every thing capable of affording nourishment is extracted from their food. | 1. Horses require to be fed, with hay, oats, or beans, articles which can only be purchased at a heavy expense. The digestive powers of a horse are weak, so that, upon an average, two-thirds more are necessary for him than are required by an ox, in order to afford the same nourishment. |
| 2. Every day that oxen are employed, they earn more than their keep; while, if properly fed, they will require no other care. | 2. A horse not only requires more stable attendance than oxen, but also often exhausts the property of little farmers, who exert themselves in order to keep a *fine team.* |
| 3. The *gear* necessary for a pair of oxen may be procured at a very moderate price. | 3. The harness of a team is, in general, an expensive article, especially when the vanity of the owner induces him to have it decorated with paltry brazen ornaments. |
| 4. At the end of five, six, or seven years, during which | 4. Horses become less valuable every year they are |

they will have more than compensated the cost of keeping them, they are in prime order for fattening; and, when fit for sale, produce to their owner a handsome sum, varying indeed according to the state of the markets, but ultimately bringing him a considerable clear profit. The same event will follow, if, through accident, the beast is lamed, or rendered unfit for work.

kept. They are liable to spasms, farcy, glanders, foundering, cankers, and a host of diseases too numerous to be here specified, from all which oxen are exempted, (these animals being subject to few diseases, except a scouring, or looseness, that reduces their value;) while horses are, by sudden illnesss, or lameness, speedily diminished in value, from *forty* to *four* guineas, and at length become food for dogs, their hide only being in any degree serviceable to mankind.

Another advantage arising from the keeping of oxen preferably to horses will be, the introduction of a more lenient conduct towards those useful animals; and, as has been judiciously observed, in proportion as ox teams are used, they certainly diminish animal suffering; for no man will work his ox team so hard, or feed it, so inadequately, as horse teams are sometimes worked and supported, merely with the view of gratifying a false vanity.

*The following comparative statement of the expense of keeping, management, &c. of horses and oxen, will probably elucidate the facts above attempted to be brought together.*

| HORSE. | | | | OX. | | | |
|---|---|---|---|---|---|---|---|
| Prime cost of a horse at four years old . . | £.30 | 0 | 0 | Prime cost of an ox at three years old . . | £.20 | 0 | 0 |
| Keep, shoeing, attendance, &c. &c. for ten years, at £.30 *per Ann.* . . . . . | 300 | 0 | 0 | Keep, &c. for ten years, at £.10 *per Ann.* . . . . | 100 | 0 | 0 |
| | £.330 | 0 | 0 | | £.120 | 0 | 0 |
| Deduct the value of skin and carrion . . . . | 1 | 1 | 0 | Deduct the value of fat . . . . . | 40 | 0 | 0 |
| | | | | Total cost of an ox . . . . . | £.80 | 0 | 0 |
| Total cost of horse . . . . | £.328 | 19 | 0 | | | | |
| Ditto of ox . . . | 80 | 0 | 0 | | | | |
| Difference in favour of the ox | £.248 | 19 | 0 | | | | |

## ON THE COMPARARIVE UTILITY OF HORSES AND OXEN FOR DRAUGHT.

[From the Edinburgh Farmers' Magazine.]

SIR,

As it is evident, notwithstanding the undeniable utility of good draught oxen, that they are now nearly *out of fashion*, (and when that is the case a *good* old fashion is as ob-

solete as a *bad* one), it might have been presumed, that the long continued dispute, on the comparative merits of them and horses, was dying away. However, being in some sort called upon by your correspondent M, Vol. IV. p. 293., who, in a strain somewhat exulting, asks, what I shall say to his statement of work performed on his farm by two horses only, I venture once more to assert the utility of my old favourite the ox.

If your correspondent will have the goodness too look again at the paper he alludes to, I believe he will there find it stated, that my oxen constantly laboured with the heavy draught horses, and actually performed as much work, and to as good purpose; and I have still no doubt that the like quantity of work might be obtained from a pair of good oxen, as he states to have been performed by his pair of horses.

The point at issue appears to me to be this; whether it be possible to obtain as much labour from oxen, as from the heavy black cart horses now so much the favourites of most farmers, even on *small* farms, (for many of these do not exceed 100 acres), not as from horses of a lighter and more active description, such as the light sandy soils of Norfolk are worked with. If the question is discussed on these grounds, I have little or no doubt the result will be in favour of oxen.

A discussion of the comparative propriety of large and small farms, in this country, would lead us into a very wide field of controversy; for I am by no means an advocate for the monopoly system, that some seem so partial to, of large farms universally, provided the little farmers, especially those of less than 100 acres, would have the wisdom and patience to use oxen, instead of their ruinous favourites the heavy horses, for what little labour they can want, on such small parcels of ground: though it must be allowed that they are induced to plough a great deal more than they can find manure for, on account of the heavy burden and

cost of those animals. Take the country as it is, and not, as many great farmers are wont to say it should be, viz. divided into a great majority of *small* farms, with a most unreasonable stock upon them, of half-worked fat heavy cart horses, it is not difficult to prove that the country at large must lose millions *per annum*, on a fair comparative statement of the expense, &c. of both. For unless we could bring the horse, at the end of his term, into the shambles, he must enter the account as an article of *wear and tear*, or carrion in lieu of good ox beef. Could we surmount our prejudice against the use of horse-flesh, as hinted by another of your correspondents, the whole matter would certainly stand on different ground; and undoubtedly it is deemed good for eating by some nations; yet I confess there is a faintness, and particular disagreeableness of flavour in this flesh, that will probably render it forever unsavory to the palates of Englishmen.

Many persons who have been at the Cape of Good Hope, speak much of the oxen generally used there, not only for ploughing the ground, but for travelling, and that at some speed; nay they usually represent the *horse*, as totally unable to cope with that burning climate, and sandy soil. There is certainly something in this circumstance, in favour of a presumption of the superior usefulness of the ox; he undoubtedly is a patient labourer, and one capable of being made equally docile and tractable with the horse, when proper methods are resorted to, and when proper animals of the sort are chosen for the purpose, which is seldom the case, I must own; for he is *certainly out of fashion*, and nothing short of extreme necessity will bring him into it again.

In order to reduce the argument into small compass, this appears to me to be a fair way of stating it. There is in England a great majority of farms under 100 acres, on which the horses kept are not fully employed; they can pay for their keep by nothing but their labour; therefore

there is a certain loss occasioned by idle and unprofitable horse-flesh. The ox can perform all the work necessary on these small farms; he is extremely valuable for something more than his labour, therefore there is no loss occasioned by idle ox-flesh.

I have a farm of 250 acres, long since let to a substantial tenant, which I know has been worked by eight oxen. I have also a number of small farms, comprising together nearly the same quantity of land, let to seven or eight tenants, on which from 25 to 30 horses are usually kept. What is the balance against the public? Certainly, were all these worked by *oxen*, the public must be a gainer. But consumption is the life and soul of trade;—so says the farmer. Here is consumption with a vengeance; but not a consumption that can possibly benefit mankind, on any enlarged scale of population.—No, no; consumption though a vicious one, may be a very good thing for the farmer; but economical consumption is most for the benefit of the community.

Let us view the subject in all its aspects, and it cannot help striking us very forcibly, that the *horse* is an article of mere *wear and tear*, and of no use to mankind independently of his drudgery; that it is, and ever must be, a *desideratum* in all populous countries, that the whole of their produce should, as much as possible, conduce to the nourishment of the *human* species: witness China, the most populous and best cultivated country in the world, and without horses, which, of course, were not eaten by man, must be considered as joint *tenants* with men, and not, like oxen, subservient to men both in life and death. In fine, we shall come to the conclusion, that the ox possesses strong presumptive evidence of superior utility in this very respect, until the population of any given space arrive at that pitch, that even the *edible* ox with his plough, &c. must of absolute necessity be superseded by *man* and his *spade*, which

of course will bring it, like China, into the *garden* state, or state of highest cultivation, 'where every rood of land maintains its man.'

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## THE YELLOW PINE.

It is with feelings of despondency, or at least an apprehension that we shall preach in vain, that we again call the attention of our farmers to the subject of planting, or else sowing for plantations of forest trees. It is indeed extraordinary, that while this Society has for nearly thirty years offered premiums for planting forest trees, they should never have had more than one application for a premium. Now that their premium for a single acre amounts to three times the average value of an acre of land (being one hundred dollars) it is still more extraordinary, and shows the great reluctance our farmers feel at undertaking any thing *new*. How must they be surprized to learn, that it is by no means uncommon in England, for a proprietor to plant out from 50,000 to 500,000 trees in a season.

Let us then abandon the hope of extensive plantations, as being beyond the enterprize and foresight of our population—but let us endeavour on a small scale to introduce one variety of our pine tribe far more valuable than any we possess. Let those of us who can afford it, introduce the cones of this pine, and raise it in our gardens, sure, that it will spread by natural means. When I say *sure*, I will state the facts on which this assurance is founded. Eighteen years since, I planted one or two acres with varieties of the pine and fir-balsam—I can now collect young trees sufficient to plant a considerable quantity of land. I could plant an acre of these young trees of a foot high, with two hands, in a day.

The tree, which I would propose should be introduced

into Massachusetts, is, I believe, foreign to it, and unknown within it; though there may be exceptions. It is what is improperly called the Norway pine—a tree which is found in Maine, New Hampshire, and Canada—in the latter country in abundance.

Of its value, the public may judge by its high price in England, and by the following account of it by Michaux. That we should have had such a treasure so near us for the last 100 years since we became an opulent people, and have made no attempt to introduce it, is certainly not any proof of our enterprize or foresight.

If in every town, one tree had been imported 100 years since, our country would now have been full of it. The Larch does not appear within ten miles of Boston, and then only in small quantities; yet, when cultivated, it furnishes innumerable young plants which may be extended over other grounds, and its value is at least three-fold greater than that of the white and common pitch pine.

M. Michaux the younger, (by way of distinction from his father, the author of a North American Flora, a treatise upon the plants of this country,) was sent out to ascertain the state of our forests, and what forest trees of America would be valuable to France.

He found nearly 140 varieties of forest trees in our country, many of them valuable, while all Europe could only enumerate about forty. Many of these he introduced into France, and it is true that you can find in England and France finer specimens of our own forest trees, than you can see here, even where the unsparing squatter has not applied his axe to the virgin forest. Cultivation has improved them in Europe, and surely it would be a reproach to us to be obliged to send to Europe for the *extinct* varieties of our own trees. We do not mean that they will literally become extinct, but this we mean to say, that they are so much more highly prized in Europe, than in our own country, which gave them birth, that you can import

them from the nurseries of England and Scotland cheaper than you can buy them here. Let us make what reflections we please on this statement, *it is true.*

It may be said, that we have yet wood enough and to spare—but yet we have not *half the variety* in any *one* section of our country of our *own forest* trees, which France or Great Britain has. *New* to them, they are *valued* and *cherished*—with us they are neglected. Who ever pretends to cultivate our varieties of Walnuts, peculiar to our country, growing scarcer from year to year? The Inglans cineraria, or Cathartica, (the butter nut) which deserves a place on every farm, for its foliage, its rapid growth, its admirable fruit, is neglected in most towns. But we return to the subject of this article, the Red or Yellow pine.—We cannot doubt that if one intelligent man in every town, in this state, would import from Maine or New Hampshire the cones of this tree, and raise a few plants in his garden, in thirty years it would spread over our country by natural means, without human aid. It will take the place of the white pine, of less value for cultivation, and of the pitch pine. M. Michaux thus introduces it:—

Pinus rubra, red pine (Norway pine.)

VULGAR NAMES APPLIED TO IT IN THE UNITED STATES.

"*Red* pine—the only name given in Canada, and often in Nova Scotia and some parts of Maine.

*Norway pine*—a name now generally given to it in Maine and the upper parts of New Hampshire and Vermont—but less suitable to it."

M. Michaux evidently considers it to be a distinct species, and not the Norway pine.

"Yellow pine—a name sometimes given to it in Nova Scotia."

TRANSLATED FROM M. MICHAUX'S TREATISE ON THE FOREST TREES OF NORTH AMERICA.

One can scarcely refrain from surprize, that nearly 200 years after the settlement of this country, we should be indebted to a foreigner, who visited our country under the double disadvantage of being ignorant of our language and of the country itself, for the first correct and full account of the riches of our forests.

"THE RED PINE."

"This tree is known by all the French inhabitants of Canada, under the name of red pine, (Pina Rouge) and the English inhabitants of Canada, their successors, have adopted it. In the northern parts of the United States, such as Maine, New Hampshire, and Vermont, it is called the Norway pine, though it differ entirely from it, the Norway pine being the abies picea of Europe. It would be therefore desirable that the name of *Red Pine* should be applied to it, in the United States, for reasons which we shall state.

In the voyage made by my father (the elder Michaux, author of the North American Flora) to endeavour to decide in returning from Hudson's Bay to the South, the appearance and disappearance successively of the several varieties and species of trees and plants of North America, he did not find the red pine, till he arrived near the lake St. John in Canada, in the 48th degree of north latitude, and it disappeared in the south beyond Wilkesbarry in Pennsylvania, in 41° 30′. (So that it is clear that it would very well grow in all parts of Massachusetts.)

The red pine is indeed very scarce in all the country south of the Hudson. You find it in Nova Scotia, where it is called, as in Canada, the red pine, and sometimes the yellow pine, (by which name it is most frequently known in Massachusetts, though the tree is rarely if at all found growing there.)

Mackenzie in his voyage to the Pacific Ocean found it growing to the westward of Lake Superior.

In no part of the United States does it form large forests, or enter in a considerable degree into their masses, but is found in large detached parcels by itself, or mixed with other trees. Like most of the other species of this genus, the pines, the red pine is found in dry and sandy soil, and its vegetation is not the less magnificent on this account, for it rises to the height of 70 or 80 feet, with a diameter of from 20 to 24 inches, and what is very remarkable in this tree, is its uniform thickness or diameter for at least two thirds of its height.

The name of Red Pine, which it bears in Canada, owes its origin to the colour of the bark, which is of a more decided red than that of any other pine in the United States. It appears to me that this character is so distinct and remarkable, as to justify the preference of this name to that of "resinous" Pine, given to it by late botanists. Another reason for preferring this name is, that many persons would be led to believe, if the name of resinous pine was given to it, that it was from this tree the resinous substances employed in naval architecture, and exported from America, were derived, which is not true. The concentric circles or annual growth of this pine are very close, and its wood presents a fine grain extremely compact. It is indeed quite heavy, owing to the quantity of resinous matter in it. In Canada, Nova Scotia, and the District of Maine, it is much esteemed for its strength and durability;—it is therefore much employed, especially for the decks of ships, because it will furnish pieces of 40 feet in length, without a knot. It is also employed for pumps. Its vegetation appeared to me to be vigorous, and I have no doubt it will succeed well in France and in all the north of Europe, and I think that the good qualities of its wood fitted for naval purposes, as well as the resinous matter which it will furnish, ought to induce France to encourage the cultivation of it."

If it will succeed in France it must in Massachusetts, and it certainly would be an excellent substitute for our pitch pine. There can be but little doubt, that if a few plantations of it were scattered through Massachusetts, it would soon take care of itself, as the barberry and many useless plants have done.

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## UPON THE DETERIORATION, OR THE DECEPTION IN CLOVER SEED IN THE BOSTON MARKET.

It is now nearly seven years, since I perceived among the seed purchased for red, or the great Dutch broad leaved clover, (which is the sort we principally cultivate,) a mixture of yellow clover or Melilot, (the Trifolium officinale, as I presume, of Dr. Bigelow.) It has been constantly increasing in quantity in the seed I have purchased, and the last year, I found in laying down nearly two acres of ground more than two thirds of the seed purchased produced the yellow clover, so that my crop is nearly ruined. It is said to be very grateful to horses, but its stalk is very feeble—it is subject to lodge, and of course to rot. It is very difficult to mow and to cure, and on the whole, should be condemned as a weed. Are there any obvious means of detecting it in viewing the seed? If there are, what are they? Are there any measures which can be adopted to give us security against this provoking evil? Inspections are resorted to as to articles of export. Perhaps this subject would be deemed too unimportant for legislative provision. But it is an evil of some magnitude, and we should be obliged by any hints of the best means of guarding against it.

J. L.

*Roxbury, May* 23, 1825.

## ANOTHER PRESENT FROM MR. KNIGHT TO THE HORTICULTURISTS.

THAT distinguished friend of physiological science, and of horticulture, Thomas Andrew Knight, Esquire, of Dounton Castle, near Ludlow, Salop, has recently sent a box containing valuable fruits. We cannot omit this opportunity of remarking upon his enlightened and disinterested zeal, not merely for the improvement of horticulture in his own country, but in others. He has enjoyed the advantages afforded by a very liberal fortune, which has enabled him to pursue his favourite occupation under unusual advantages. It will not diminish our respect for him to know, that he was one who opposed the war with America in 1775, and he has continued its steady friend to this hour.

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*Letter of Mr. Knight to John Lowell, President of the Massachusetts Society for promoting Agriculture.*

[The Letter is not dated, but probably bore date early in March 1825.]

MY DEAR SIR,

I have this day sent a box to Messrs. Thomley of Liverpool, containing plants of the different varieties of figs cultivated in this country. As to names, it is perfectly useless to give any, for the fig tree is an extremely long lived plant, and the scions springing from the root probably furnish plants capable of being cultivated through an immense period, and the ruined gardens of almost every monastery appear to have afforded plants of the fig tree. We have, in consequence, one variety known by two or three different names, and two or three varieties known by the same name. We therefore only write from what gardens they were derived.

You will soon discover the sorts which are best adapted to your climate.

I have put into the box a plant of the Pear d'Aremberg, a most excellent variety.—It is labelled No. I. A branch (or cutting) of the Sylvanche verte d'Hyver pear tree (I had no tree) is marked No. II.; this variety bears well, and is excellent in my garden.

A plum tree with some cuttings of the Downton Imperatrice Plum described in the Horticultural Transactions last year by Mr. Sabine. It hangs and shrivels on my walls, and in the month of November it is (as Mr. Sabine states) very excellent. It is a most productive variety.

A budded tree, which shot two branches last season of an *apple* which was sent to the London Horticultural Society, as the "Mela Carla" supposed to be the best apple of the world, with some cuttings of the same—some grafts or cuttings of an apple which we call in Herefordshire, the Brandy apple, from the excessive strength of its cider—it is also a fine desert or table apple in very hot seasons. It is sometimes called the Golden Hervey. I have made an effort to convey to you eight varieties of our best strawberries.

I trust that I have so packed them that they will arrive safe. No. I. is Kean's seedling, and No. VIII. is the Downton Strawberry—the others are quite new, and are probably the largest strawberries in existence; a single berry grown in my garden last year weighed 558 grains, and many others approximated that weight. The weight and beauty of Kean's seedling have caused it to be much cultivated for the London market. I however think it to be the least good of those which I send you. I send also some improved varieties of the red currant.

I send also some scions of the Hardenpont de printems

pear, which I know to be correct, having been taken from a bearing tree, and marked instantly by my own hand.

Yours, TH. A. KNIGHT.

JOHN LOWELL, ESQ. *Roxbury, near Boston, Mass.*

The above mentioned present to our country has safely arrived by the brig "La Grange." The plants are all in a growing state.

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## ON THE IMPROVEMENT OF SOILS.

WE need make no apology to our readers for quoting the remarks of the justly distinguished Mr. Young, of Nova Scotia, on the improvement of soils, by other processes, than the familiar one of applying manure. It is now practically well known to most of our intelligent farmers, that cold and wet meadows are at least as much, and probably more permanently improved by carting on sand, than by any rich manure which we can possibly apply; but we have not generally practiced the application of sand to stiff clayey soils, nor of lime to any soils. The following remarks may therefore be interesting to that class of our readers who love to think, (and we hope there are many in our country who do so.) and who are desirous of applying to agriculture that understanding which was given to them for nobler purposes than merely acquiring the knowledge of ancient practices in the agricultural art, and the manual skill of applying them. If farmers will take the trouble of reflecting on the condition of their own art in the earliest periods of the world, and consider, that every implement or article facilitating labour, which they now *use* and consider as familiar, were the results of human ingenuity and invention; if they will recollect, that all the plants they now raise were comparatively miserable in their natural state, before the industry

of man had rendered them fit for human food, and for the subsistence and perfection of domestic animals, they will probably not rest contented with the knowledge which they now possess. They will perceive, that the surface of the earth is as susceptible of improvement as the plants which grow upon it; and they will be eager to ascertain the laws, or rules, (not human laws and rules, but those of Providence) by which good soils are made. All our good soils are the result of chemical and mechanical changes. Nature is constantly at work to aid us; but we can by studying the processes by which she operates, improve her gifts more rapidly.

All the common and most familiar processes of Agriculture are nothing but an attempt to aid nature. Every farmer, without knowing it, is in fact a chemist and natural philosopher. He breaks up his ground, because he finds the grass will not grow as well as he could wish; by this process he enriches it by the food he furnishes to future plants, by the rotting and decomposition of the old—by pulverizing and mellowing the earth, and thus permitting the new plants to strike deeper roots, and to grow more vigorously. If the farmer will only pause one moment, he will see that his old practices are founded on principle and on human discovery. He knows not the *man*, the individual who made the improvement, but it was human intellect which effected it. Yes—without irreverential disparagement to the Author of all our blessings—it is man, who has made Agriculture, what it now is. It was God, who ordained that man should work for his subsistence, and gave him the faculties and powers to enable him to do it. But his law is, that we shall *use* these faculties, otherwise the earth will not produce its increase. Take for an example, the practice of the French inhabitants of Canada who, for a century, would not use the manure produced by their cattle. Could any thing be more absurd? J. L.

*Letter 15th of Agricola.* By Mr. Young, *of Nova Scotia.*

After having travelled over so wide a field of illustration, in the course of which I have touched on many topics of interest and instruction, I now approach the last and most important point in the second section of my plan. If my readers have been at all attentive to my strain of argument, and made themselves masters of the multiplied views I have exhibited, they will find no difficulty in appreciating the fitness and efficacy of the remedies which I am about to prescribe, in order to rectify the natural defects, and conquer the untoward qualities of different descriptions of soil lying within the bounds of the Province. It is only by having recourse to first principles, and laying them down in order and with precision that any thing like system can be introduced into the practice of husbandry: and the advantages of this when grounded on experience and placed under the direction of this faithful and unerring monitor, are manifold and apparent. There should be nought like quackery in Agriculture—no authoritative tone of dictation to the farmer without assigning satisfactory reasons for the practice recommended: for this profession is not a piece of patch-work, made up of arbitrary rules and doubtful maxims handed down immemorially from father to son, but it is a science, which walks hand in hand with philosophy and takes the full benefit of her lights and which disdains to command, till it informs the understanding.

I need make no apology for taking a slight retrospective glance of the leading doctrines I have delivered on Soil, in order to comprise them into one view, and set them, as it were, before the eye of the mind in a conspicuous and impressive attitude. I have said, that the soil serves three purposes in the process of vegetation: it furnishes a bed in which the roots expand themselves, in order to give firmness to the stem, and collect the necessary nutriment; it is the

laboratory in which putrefaction goes forward, and it has the capacity of fixing and absorbing the gases or streams set at liberty during decomposition; and it also chiefly supplies the moisture to the plants which live and grow upon it. To answer these ends, Nature must have either formed the mould, which, like a robe, invests the habitable Globe, of a triple and corresponding character: or she must have spread and blended into one composition different materials adapted to these essential purposes of vegetation. She has made choice of the latter plan, and it opens an interesting and beautiful view of design, to mark the qualities of the primitive earths in connexion with their subserviency to the vegetable kingdom. To render the surface penetrable by the roots and the smaller fibres, and to keep it open and friable, sand or gravel are provided in such abundance that they pervade both the old and new Continents, and are met with in all countries and climates: to render it again retentive of moisture, that the plants which vegetate most vigorously in hot weather, might not be parched by excessive drought, clay was thrown into the heap, and blended with the sand: and lastly to render it a fit laboratory for resolving animal and vegetable matter, and applying it to use, lime was added, which assists the putrefaction and also enters into combination with the liberated carbonic acid. Magnesia—the scarcest of all the four primitive earths—serves as a substitute for lime, and is productive exactly of the same effects; but as a calcareous earth supplies its place, taking the most favourable view of its efficacy, it is distributed with extreme parsimony, and in most cases, is entirely dispensed with. Here we behold a beneficent adaptation of means to ends in the constitution of the elements of soil, and the purposes of vegetation are promoted by corresponding earths, which are profusely scattered everywhere, and in many places are compounded by the laws of matter, and made ready for use.

If these illustrations be just, every soil is more or less

defective in proportion to the absence of one or more of these ingredients, and when perfect and capable of the utmost productiveness, it must arise from a due mixture of the whole. Hence originates a curious question, which has attracted a considerable degree of notice, but has not yet received any satisfactory and definite solution: What is the proportion of the primitive earths, which forms the most fertile soil? To ascertain this with some tolerable accuracy, the analysis of various soils has been undertaken by chemists, and the products of each have been noted and compared. Mr. Tillet,* in some experiments made at Paris, found that a soil composed of three eighths of clay, two eighths of sand, and three eighths of finely divided limestone, was very proper for wheat. Mr. Henry examined a fertile corn soil in East Lothian, Scotland, and divided it into 100 parts. Of these, the clay amounted to 45, the sand to 25, the calcareous earth to 11, the vegetable manure to 9, and the water in absorption to 4, and the remaining 6 were taken up in chemical compounds, chiefly the sulphate of lime. He submitted, also, to the test of experiment a soil from Somersetshire celebrated for producing excellent crops of wheat and beans, and found it to consist of eight ninths of calcareous marl—a compound of clay and lime—and one ninth only of sand. Sir H. Davy† discovered, that a soil, containing eleven parts out of twelve of sand, could yield a tolerable crop of turnips; but, if more sand was added, it became absolutely sterile. From these opposite results this legitimate deduction may be drawn, that the productiveness of the earth does not depend on any exact proportion of the primary ingredients, and that a very great latitude is allowable in their composition: and this is analagous to that law of variety which is observable in other arrangements, and seems to govern all the operations of Nature. It cannot, however, be denied, that this remark

* Henry's Chemistry, p. 426. † Farmer's Magazine, vol. 16, p. 482.

applies more particularly to the clay and sand—the two principal ingredients—which from the above experiments may be mixed up and assorted from one ninth to eleven twelfths: that is, a soil may consist of clay except a ninth part of sand, or of sand except a twelfth part of clay. These two extremes so wide of each other, leave a vast intermediate space to be filled up, and account for the almost infinite variety of loams,—truly productive—that are met with on our globe. But lime must not be introduced into the composition of soils with the same freedom of admixture. Its beneficial qualities are only exerted when a moderate dose is applied; and it is universally pernicious when existing in excess. Magnesia is equally, and in all probability more so; for many are of opinion, that it acts even in the smallest quantities as a poison to vegetation.

These views will be found highly conducive to the right understanding and judicious application of the remedies, to which the farmer should have recourse in rectifying the defects of any field he is solicitous to improve. He has only to inquire, which of the original ingredients is wanting, and then endeavour to find it at the easiest and cheapest rate: for he may be assured, that the utmost fertility is unattainable without the presence of all the elementary substances.

Under the guidance of these conclusions, and aided by the lights which they afford, I shall proceed to examine shortly all the descriptions of soils found in Nova Scotia, and appropriate to each a few practical observations.

1. *Marsh*, the formation of which was explained last week, is compounded of all the primitive earths, and is confessedly the best of all our soils. It requires to be embanked against the ocean, that it may become fit for tillage; but in all other respects it is placed beyond the help and operations of art. The ingredients are so happily mixed, that any attempt to modify them would be injudicious tampering, and as likely to issue in its deterioration as its im-

provement. I am far, however, from the belief, that it can be cropped for hundreds of years, without impairing its natural productiveness; and all our ideas of a perpetual fertility, independent of fresh supplies of animal and vegetable matter, are mere chimeras of a speculative imagination. Every successive crop vegetates at the expense of the decomposing dead substances in the soil, and draws from them its strength and nourishment. The original store, therefore, must become exhausted in proportion to the number of years the land has been under cultivation, and if these be extended to an indefinite length, the inevitable consequence must be, the extraction of the whole nutriment. In conformity to this hypothesis, it has been found, that the rich meadows in America, which were supposed to contain the elements of an inexhaustible productiveness, have been much sooner worn out than was expected, and thus blasted the idle and unsubstantial hopes of visionary projectors. The same result must follow in Nova Scotia, if our marshes are laid under an uninterrupted course of cropping, and neither renovated by the application of manures nor repaired by lying in pasture. To this conclusion experience has now brought an accession of strength, and the diminished produce of these fine levels is an incontestible evidence of the erroneousness of that theory which has been set up in despite of the first principles of vegetable nature. True it is, that some of our marshes, and I believe spots in the *Grand Prairie* of Horton may be instanced as an example, have been under wheat and grass alternately and in succession, for more than a century past, and have not been replenished during that long period with any sort either of fossil or putrescible manure; but the fertility is here preserved by the uniform practice of laying out these marshes to grass, and keeping them so for several seasons. Notwithstanding this interval of rest, which to a certain extent recruits all soils, the produce of our best marshes may now be estimated at from 12 to 15 bushels,

which is not the half they once yielded, or would again yield, were a different system of management adopted by giving them a certain portion of the barn manure. This is the genuine and substantial food of vegetables, and on nothing else will they *fatten*, if I may be permitted to borrow this term from the animal economy. It is pitiable husbandry to extract from such excellent lands these diminutive and insignificant crops.

II. The fresh water intervals are our finest loams; because the clay and sand of which they are formed have been blended by the deposition of the floods, and consist altogether of the minutest particles of each. I am satisfied, that the application of lime to these would be of incalculable benefit, as furnishing a quickening and stimulating substance, which would assist putrefaction, and serve to fix and absorb the fructifying gases. Some of them, I am certain, already contain a portion of calcareous earth brought down by the torrent; but in none of them which I have examined, does it exist in sufficient abundance to exercise its full activity; and all of them would be greatly improved by the use of this excellent and valuable fossil.—Too great a dose in the first instance need not be given; and although the expense of 60 or 80 bushels per acre swells into magnitude in the eye of a farmer, he should recollect, that the benefits of liming are permanent, and are felt for thirty years afterwards.—Lands have been limed in Scotland at the rate of three hundred bushels per acre.

III. Upland loams are exactly formed of the same materials with interval; but the mixture is not so complete, and the parts are of a coarser and bulkier description. The loams generally in the Province are inclined more to sand than clay, and on that account are admirably adapted to the turnip husbandry. By tillage they could be pulverised into a fine soil capable of producing all sorts of green crops —and I hope the period is not very remote, when their capability shall be put to the test. Lime would be a great

and beneficial improvement to them all, as it is the only ingredient wanting to complete and perfect their composition. The quantity that should be laid on, must depend on many circumstances, so that no rule which I could prescribe, would be of general applicability, and I fear the expense of burning and transporting it will operate with most farmers in making them lean too much to the safe side. When the practice of liming was first introduced into Great Britain, which is only about 70 years ago, the tenants of those days proceeded with great caution, and harrowed in a very inconsiderable quantity: but afterwards, when its beneficial effects were palpable and acknowledged, they advanced with more boldness, and applied from 150 to 250 bushels per English acre. The luxuriance of the succeeding crops justified their most sanguine expectations, and quickly repaid this vast outlay. This success encouraged to farther efforts; and many of them laid on a second time as large a quantity as at first. But this after-dose was not accompanied with the same striking advantages, nor offered so sure a prospect of remuneration. Some tried a third, but this was followed by no sensible improvement; and in general the capital expended on the second and third limings was never replaced; and in many instances, a visible deterioration in the productiveness of the soil was the unfortunate consequence. This experience corrected the hasty conclusions drawn from the first attempts; and it is now a recognized maxim in British Agriculture, that an overabundant dose should be cautiously guarded against, but that it is perfectly safe, and highly beneficial to apply it to the extent of three or four hundred bushels, and in some few soils of stiff clay, in a greater quantity, though not all at once, but the one half at an interval of a complete rotation of crops. I conceive, there is no great difficulty in assigning the cause of this disappointment. Lime is one of the original ingredients of which a perfect soil is composed, and an excess of it as well as of any of the others must be a defect, upon those principles which

have been already illustrated; and as only a very small portion enters into the organs of plants and is necessary to the constitution of their fibre, perhaps the soil should contain only a quantity proportional to the wants of vegetation. Whether this be the philosophical explanation of the difficulty is of immaterial consequence; since the fact itself is certain and undoubted, and has led to a more temperate and guarded use of calcareous earth.

Further, it may be applied to our loams either in the shape of quicklime as it comes from the kiln, or in that of a carbonate, as pounded limestone, marl, marsh mud, or in short, any modification of it found in nature. Qucklime is so easily pulverised, and in that state capable of so intimate and close an union with the soil, that a preference is naturally given to it in the general system of farming; but marl may be used as an excellent substitute, and with almost equal success. Through the medium of one of my correspondents, I am in possession of a specimen of very fine marl, taken from Mr. Cunningham's lands in Windsor, which would form a valuable manure for light and common loams.—The value of marsh mud on uplands is derived from a variety of circumstances, which combine to render it a capital manure; and too much attention cannot be paid to this great and inexhaustible store of agricultural riches. To sandy loams, it supplies a quantity of clay which they need, in order to acquire tenacity and adhesion; to poor and wornout soils, it becomes a valuable dressing from the remains of animal and vegetable substances incorporated in its formation; and to all uplands, it affords a quantity of lime—from the disintegration of calcareous rocks, particles of which have been washed into the sea by the ceaseless action of torrents,—and from the decomposition and gradual destruction of shells.

IV. Sandy or gravelly uplands, in the present state of this colony, are hardly worth cultivation: for it is egregious folly to waste capital on unproductive barrens, while there remain in a state of nature, and unappropriated, such vast

tracts of improvable loam; yet as the general principles which I have laid down are applicable to all soils, and as some sandy patches are comprehended within the limits of our cleared settlements, it may not be amiss, briefly, to chalk out, with regard to them, the obvious line of procedure.—What they want is a binding and tenacious substance —retentive of moisture—and clay in this case presents itself as decidedly the best manure. We previously mentioned, that eleven parts of sand with one of clay would constitute a soil, that would yield a tolerable crop of turnips; and therefore, to spread over the surface half an inch of clay, and afterwards to mix it up with the soil to the depth of six inches, must effect the cure of its barrenness. A greater proportion would be desirable; but this is the least at all consistent with fertility, and if to this mass so compounded, were added clayey marl, and dung, it might be brought slowly to a productive and vegetative mould.—It was the adoption of this method, that laid the foundation of the Norfolk husbandry, so justly celebrated in Young's Eastern Tour.* That county in England, before the middle of the last century, was a wide and worthless tract of sand, rented only, as sheep-walks, at about 1s. 6d. per acre. It possessed one natural advantage, to be found perhaps no where else to an equal degree; its subsoil consisting of a white and yellow marl or clay. On the first discovery, the farmers spread this in large quantities, many of them at the rate of 30 loads per acre, and afterwards they reduced it to 40 and 60. The benefit of this first layer lasted for thirty years, and then half as much more replenished the exhaustion. Rents rose rapidly to twenty shillings per acre; and this mixing of clay with sand gave rise to a particular routine of cropping—known by the name of the Norfolk System, which we will afterwards take occasion to explain.—The fact is, that wherever Nature has not blended three prima-

* Bath Society Papers, vol. I. p. 19, 20.

ry ingredients of soil—sand, clay, and lime—it is necessary that the deficiency be supplied by the operations of man.

V. Clay, in its unsubdued state, is the most barren of all soils, and requires more than any other an expenditure both of capital and labour. It may seem paradoxical to recommend the laying of sand* on this stubborn earth, but wherever it can be easily procured, it is the most certain and infallible remedy, and will much sooner work the effect.—About 14 years ago, in another country, I rented a small field, which consisted of a friable loam, except one corner, where protruded on the surface a stiff and unyielding clay, which had proved so obstinate to the former occupiers, that they had given it up in despair, and it was accounted hardly worth seed and labour. Previous to my possession, it had been limed and manured, and more than once subjected to a naked fallow, and still its refractory nature refused to be tamed, though rich in calcareous and decomposing matter. About this period I recollect, that Miller's Dictionary on Gardening and Agriculture fell into my hands; and under the article Earth, which any of my readers may consult at their leisure, he recommends sand as an efficient manure for fat borders; and stated that the gardeners about London were in the practice of using it, to restore the virgin temper of the soil in lieu of trenching; and also that it would prove useful on "clays, to open the pores, give freedom to the circulation of the sap, and make way for the extension of the roots." I formed at once the determination of making the experiment on my barren corner, and proceeded to cart *dead* sand from the pit, and spread it on the clay about the thickness of an inch, mixing it well with the whole soil. A sagacious neighbour of mine was highly tickled at the oddness of my conduct, and jocularly rallied me on converting a sand pit into a dung yard. This application, however, wrought like enchantment; and

* Young's Calendar, p. 42.

to his confusion, and my own astonishment, the crop surpassed all expectation, and was fully equal to what grew on the other parts of the field. The cure was complete; for ever after while under my management, that piece vied with the rest in native productiveness.

From all this reasoning it seems deducible, that *sand* and *clay* in almost any proportions, with a quantity of *lime* laid on with judgment, but not in excess, constitute the best and most fertile soil; and that the only mode of improvement is to supply whatever sort of these original and elementary ingredients is deficient in the composition. But all this will be far from bestowing lasting fertility, unless to the mass be added decayed animal and vegetable substances, which unquestionably minister to plants their principal food and nourishment.

AGRICOLA.

*Halifax, Oct.* 21, 1818.

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## ON SALT, AS A MANURE, AND AS PROMOTING THE HEALTH AND FATTENING OF DOMESTIC ANIMALS.

It is natural, that cultivators should be constantly employed in searching for some more convenient, cheap, and expeditious mode of increasing the growth of plants. In all countries, and in all ages, the ingenuity of man has been exerted to procure such ready modes of advancing agriculture. Although we have no strong confidence, that any improvement of art or science will ever give us a good substitute for the natural manures, arising from the dung of animals, partly consisting of animal, and partly of vegetable materials; yet it is unquestionably true, that science may come in aid of these obvious and common expedients. There can be no question that the application of sand to clayey and wet soils is highly beneficial, and the singular effect of gypsum, (a discovery of very modern date) the

changes which it produced, as yet not satisfactorily explained, may lead us to hope, and justifies the expectation, that much may be effected in aid of common articles of manure —*certainly never to their exclusion*, by scientific discoveries. The use of lime was the effect of scientific reflection, and in countries where lime can be obtained at cheap rates, the evidence is perfect that it is a most valuable addition to our list of manures. All the scientific farmers of Europe are at work to find out some cheap article, easy of transportation, which will come in *aid* of the *natural manures*.— No man of sense is so absurd as to expect that they will ever be superseded. The French cultivators have recently advertised their "poudres vegetatifs," (powders promotive of vegetation,) and recently there has been a suggestion that the oxymuriate of lime applied in a liquid state is a most powerful manure. We shall institute without too sanguine confidence in its success, some experiments to test its value. We have doubts of its applicability to cultivation on the great scale, yet we see no reason why, if the statements are true, as to its effects, it should not be applied to fields of corn with as much effect, and as much ease, as the putting a table spoon full of gypsum in each hill. This is in itself a miracle never explained, and we may have other miracles *in store* for us, as great. There is one discovery which is unquestionable, and hitherto never applied to agriculture, though most abundantly established by irresistible evidence in *Horticulture*, and that is, the superiority of manures applied in a liquid state—when we apply a shovel full of dung to a hill of corn, or potatoes, a very small portion of the fertilizing matter can be taken up by the plant. It is proved—it is clearly proved, that if the goodness or the essential qualities which promote vegetation are extracted by submersion in water, and applied to the plant, the effect is very great. How far this admitted and well established fact can be applied to agriculture generally, may be doubted.

It certainly could not be applied to fields of rye, wheat, or barley; but possibly it might be to Indian corn and potatoes. We throw out the hint only, because it is as well proved, as the fact, that gypsum acts powerfully on the growth of plants, that liquid manure in gardens, upon trees and shrubs, has within the last ten years produced surprizing effects.

We return to the subject of the present article, Salt, as a manure, and as promotive of the health and growth of animals. There has been a vast deal written both in its favour and against it. It is well known that applied in too great quantities, it is destructive of vegetable life; and it is equally well known by the case of sailors, fed on salt provisions, that in excess, it is equally destructive of animal life and health. This, however, is equally true of almost every other useful thing;—still we should not reject it, because its abuse may produce an evil. Much has appeared on the subject of salt as a manure, and as a condiment, or excitement to the appetite of animals, but we think that the whole subject was never so thoroughly discussed as it was in Great Britain on the proposal to repeal the duties on salt, and we shall therefore lay before our readers at the risk of repetition, all the evidence collected on the subject of the value of salt in its two separate and independent uses, as a manure, and as contributing to the health of animals.

We shall make our extracts from a work written by Samuel L. Parkes, Esq., member of many learned Societies in Europe, and corresponding member of our own Society for the promotion of Agriculture—a learned and indefatigable man devoted to science and to the cause of human improvement. His work is chiefly a compilation of all the authorities, ancient and modern, on the value of salt, for various agricultural purposes, and we know not, how we could possibly devote the pages of *one* number of our journal better, than by laying before our readers, in this condensed form, what they could not learn, without extensive libraries,

and much reading. Indeed, such is the chief value of journals like our own, to place *within the reach of thinking and reflecting men*, the *labours of others*, who have had *access to books which they* (our readers) *cannot procure*. Of course, it will be understood, that we neither vouch for the soundness of the opinions of the various authors quoted, nor for the accuracy of *their experiments*;—but it is much better to know what *has* been thought, and said, upon any subject whatever, than to be *entirely* ignorant of it. With this view alone, we present the whole mass of authorities cited by Mr. Parke on a very important question agitated in England, on the proposed repeal of the duties on Salt.

"Dr. Holland, in his Agricultural Survey of the County of Chester, has clearly shown the good effects resulting from the use of salt on grass-lands, and also as a manure for wheat and barley. Among other instances he relates the following:

"After draining," says he, "a piece of sour rushy ground about the middle of October, some refuse salt was spread upon a part of the land, after the rate of eight bushels to the acre, and in another part sixteen bushels. In a short time the vegetation disappeared totally, and during the month of April following not a blade of grass was to be seen. In the latter end of the month of May a most flourishing crop of rich grass made its appearance on that part where the eight bushels had been laid. In the month of July the other portion produced a still stronger crop; the cattle were remarkably fond of it; and during the whole ensuing winter (which is ten or twelve years since) and to this day, the land retained, and yet exhibits, a superior verdure to the neighbouring closes."

*Dr. Holland's Survey of Cheshire.*

Dr. Darwin, in treating of salt, as a manure, observes, That it is a stimulant that excites the vegetable absorbent

vessels into greater action than usual; and in a certain quantity it increases their growth, by enabling them to take up more nourishment in a given time, and consequently to perform their circulations and secretions with greater energy.

The late Thomas Butterworth Bayley, Esq. who was a Fellow of the Royal Society and Honorary Member of the Board of Agriculture in London, in his Thoughts on Manures, after enumerating nineteen different substances which improve land, adds, "There is another source of improvement LOST TO THE COUNTRY, but *not through the fault of the farmers*, viz. refuse rock-salt, and refuse liquor from the salt-works. I trust the very impolitic restriction which forbids the use of this valuable manure, and causes its *total loss*, will soon be removed by the exertions of this Society and those of the Honourable Board of Agriculture."—*From an Address read to the Members of the Agricultural Society of Manchester, October* 22, 1795.

Some years ago the Earl of Dundonald, who was anxious to obtain the repeal of the salt duty, drew up a list of articles to be submitted for taxation in lieu of salt. At the bottom of the schedule he adds the following observation. "The preceding statement," says he, "does not include the duty on rock-salt employed either in the state of salt,or when prepared into *Glauber salt* or *mineral alkali, as a manure*, and which can be afforded to be done, paying a duty of thirty shillings per ton. The consumption *for this purpose* may probably in a few years, when the benefit from the use of salt, or the saline substances prepared from it (*as a manure*) is generally known, amount at the most moderate calculation to FIVE TIMES *the quantity of salt* consumed in Britain FOR ALL OTHER PURPOSES."—Copied from *Earl Dundonald's Evidence before a Committee of the House of Commons in the year* 1801.

Although sufficient evidence has, I presume, been already given to prove the efficacy of common salt in promoting vegetation, I could not resist the inclination which I felt to treat my readers with the following impressive expostulation from the pen of an eminent and noble British senator:

"The science of agriculture," says he, "is by no means at its height; and in the almost miraculous advance of chemistry, new means may be found from the concentration of known composts, and the discovery of new, to lessen the cost of culture, and to increase its returns. But here again your Revenue stalks like a ghost across my path, whichever way I turn; as otherwise you have a superior unbounded source of improvement trodden under your very feet, and cast as refuse into your rivers, beyond all that chemistry is ever likely to discover. You have SALT in endless abundance, but your *necessity* turns it into *money*, even to forty times its value, instead of spreading it abroad for various uses, to rise up in property which no money could purchase.

"After thus taxing to the very bone, this life's blood of your people, why, to be consistent, do you not bind up by law their veins and arteries to prevent circulation? Do you know what salt alone would do for you, if it were not seized upon as a revenue, and clung to, perhaps as a plank which you cannot quit in your distress? I will speak of its other uses hereafter; but can you be so ignorant as not to know, that by taking the tax upon it *directly as money*, you rob yourself of fifty times its amount in the productions of your soil; in your fisheries and manufactures; and in the universal prosperity of the country?

"Lime, which has caused to start into life the most inert and steril parts of Great Britain, is just nothing as a manure, when compared with SALT, which differs from it besides in two remarkable qualities, decisive of its superior value.

"Lime, and I believe all other known composts, are powerful only according to the quantities in which they are

used; whereas salt, to be useful, must be sparingly applied; it *corrupts* vegetable substances when mixed with them in *small* quantities, but *preserves* them when it *predominates in a mass*. It is needless therefore to add, that, independently of its comparative lightness, the expense both of the article in its carriage must be very greatly diminished. Yet you rob the mother of your people of this food which indulgent Nature has cast into her lap, sufficient, as you will see hereafter, to feed all her children, even if their numbers were doubled."

### ON THE USE OF SALT FOR HORSES, SHEEP AND CATTLE.

On this subject volumes of evidence might be collected, but I trust that the few following extracts will be sufficient to convince the candid and unprejudiced reader.

"There is a custom in Spain and Portugal," says Sir Thomas Bernard, "which I have personally witnessed the practice of in North America, of daily placing on stones in the sheep pastures, some dry salt for the use of the sheep. I have seen each of the sheep in their turn, and with eagerness, take a small portion of it. This is considered as a preservative against the *rot*, and as contributing to their general health and good condition. In Spain the *cows* are regularly supplied with a little salt; and the increase of their milk, and the benefit which stable-fed cattle derive from it, are confirmed by many authorities. A Cheshire gentleman informs me, that when he wants extraordinary exertion from his horses, he always gives them a little salt; and this is analagous to the practice in the East, where the camels are allowed salt during the passage of the caravans over the Desert to Alexandria, as a support in the extreme fatigue which they undergo."—*Sir Thomas Bernard's Letter to Mr. Vansittart*, page 15.

Dr. Anderson, whose testimony will have great weight with every enlightened agriculturist, says: "There is no

substance yet known which is so much relished by the whole order of graminivorous animals, as common salt. The wild creatures of the Desert are so fond of it, that wherever they discover a bank of earth impregnated with a small portion of salt, they come to it regularly ever after to lick the saline earth. It is also admitted by all who have tried the experiment, that salt given along with the food of domestic animals (except fowls) tends very much to promote their health, and accelerate their fattening; and although some persons, who have been at a loss to account for the manner in which this stimulant could act as a nutritious substance, have affected to disregard the fact, yet no one has been able to bring the slightest show of evidence to invalidate the strong proofs which have been adduced in support of it. It is not, therefore, an extraordinary position, to say, that by a proper use of common salt, the same quantity of forage might, on many occasions, be made to go *twice as far* as it could have done in feeding animals had the salt been withheld from them. If so,—then we have here laid open to our view an easy mode of augmenting the produce of our fields to an amazing extent; for, if the same quantity of forage can be made to go, not twice as far, but one twentieth part only further than it now does, it would be the same thing as adding one twentieth part to the aggregate produce of meat for beasts throughout the whole kingdom."

To the beneficial use of salt upon cattle in augmenting the quantity and improving the quality of their milk, and of the cheese which it produces, we have a testimony of eighteen hundred years standing:

"Pecudes, armentaque et jumenta SALE maxime solicitantur ad *pastum*, multo largiore *lacte*, multoque gratiore etiam in *caseo* dote."—*Plin.* lib. xxxi. cap. 7.

From a Memoir by M. Villar concerning the disorder

among the cattle at Champsaur in the province of Dauphiné, I extract the following observations:

"The mortality," says M. Villar, "has increased in our fields since the augmentation of the price of salt has obliged the farmers to give it more sparingly to the cattle. In the district of Champsaur, and the adjacent countries, we are accustomed to give to every ox and cow four ounces of salt every eight days, and about an ounce to every sheep and goat at the same intervals. When this practice is neglected, the animals eat less; they lose their spirits; their hair rises; they go licking in the stalls the bottom of the walls where the salt-petre is formed; they grow lean, become barren, and disease ensues."—*History of the Royal Society of Medicine at Paris*, for the years 1777 and 1778. Quarto, Paris printed 1780.

"That *sheep* are fond of salt is beyond all doubt; it is equally certain that to these animals it is a preservative against many diseases, and if I am not greatly mistaken, contributes in no small degree to render their wool finer." —*Landt's Description of the Ferro Islands.* London, 1810.

Pliny the naturalist, whom I have before quoted respecting the use of salt on cattle in increasing their milk, was also acquainted with the medicinal effect of salt upon the health of sheep; for, still speaking of the uses of salt, he adds:

"Pecorum quoque *scabiem* et boum illitus tollit. Daturque lingendus."—*Plin.* lib. xxxi. cap. 9.

"The Onondago, situated in the state of New York, is a fine lake of brackish water, surrounded by springs, from two to five hundred gallons of the water of which make a bushel of salt—all the animals of these parts have a great fondness for salt. The cattle of farmers who give this substance to their stock prove superior in value by 25 per

cent. to such as are not supplied with an article so essential not only to their general improvement, but their health. The native animals of the country, too as the buffalo, elk, deer, &c. are well known to pay periodical visits to the saline springs and lakes, bathing and washing in them, and drinking the water till they are hardly able to move from the vicinity."—*Ashe's Travels in America*, vol. i. p. 95.

In the Memoirs of the Royal Academy of Sciences at Paris, is a Paper on the use of Salt for Cattle, an abridgment of which is published in the 24th volume of the Annals of Agriculture, and is as follows. It was communicated to Arthur Young, Esq. by a correspondent, in the following manner:

"In looking over the Memoirs of the Royal Academy of Sciences at Paris, I met," says he, "with a paper entitled '*Physical Observations on the Effect of Salt in fattening Cattle.*' The title excited my curiosity; and on reading the memoir, the author's reasoning appeared to me not only plausible, but convincing. His views are certainly enlarged, and directed to objects of the most important kind, viz. the improvement of land and the increase of cattle. He lays it down as an axiom, or self-evident truth, that by increasing cattle, land may be improved; and by improving land, cattle may be multiplied.

"The farmer," he says, "who has more than an ordinary stock of working cattle, reaps a double advantage: the one, by having his work done in season; the other, by enriching a greater portion of his land by means of their additional manure. The only difficulty is, how to maintain an increased number without increasing the expense: this, he asserts, may be done by the USE OF SALT, and advances the three following propositions:

"1. That salt given with the food of cattle, augments the nourishment of that food.—2. That in proportion to the quantity of salt eaten by cattle, the effects of that augmen-

tation will be perceivable.—3. That no ill consequence will follow from excess of salt eaten by cattle, even though it should be given them without stint. These propositions he endeavours to support by unquestionable facts.

"In the jurisdiction of Arles, in the county of Provence, there is," he says, "a district called the Crau, extending in length about six leagues and in breadth about three, the whole surface of which is covered with small rough stones, and not a tree or bush is to be seen in the whole district, except here and there upon the borders; yet on this spot so seemingly steril, by the free use of salt, more numerous flocks of sheep are bred and reared than upon any other common of equal extent throughout the whole kingdom; and what is not less remarkable, the sheep are healthier, hardier, and endure the severity of the winter with less loss, though they have fewer sheep cots for covering, than those fed and bred on more copious pastures, and that have besides the advantage of more convenient shelter. Add to this, that the wool of the flocks bred and brought up in the Crau is not only the finest in the whole country, but bears the highest price of any in France. From hence he concludes, that it is to the unlimited use of salt that these surprising effects are to be ascribed; for it frequently happens that the Crau is so burnt up in the summer, that the poor animals are forced to turn up the very stones to come at the few blades of grass that grow round them, and yet none perish for want of food. Let every excellence, therefore, that can reasonably be supposed inherent in the herbage be allowed to it; yet the quantity of it is so small, that, without the abundant use of salt, a *fourth part* of the sheep kept in the Crau could not subsist on it.

"Having proved his first proposition incontrovertibly, he proceeds to prove the second, by recommending an easy experiment, which it is in every farmer's power to make, and that is, to give one half of his cattle salt, and to the other half none: by this simple trial, he says, in less than

a month the difference will be discernible; the cattle to which the salt is given will show it in their looks, in the sleekness of their coats, in their growth, and in their strength and firmness of labour. He adds, that with little more than half their usual food, all these effects will be produced. To establish his third proposition, he appeals to the practice about Arles, where the cattle have as much salt as they will eat, and none are so healthy, or thrive so fast, as those that eat most of it.

"To the above observations of our correspondent," adds Mr. Young, "we may state, that in Spain, where the finest wool in the world is produced, great quantities of salt are given to the sheep; to which they attribute, in a great measure, the *fineness* of the wool. The salt is laid upon the rocks, and the sheep who come and lick it are exceedingly fond of it."

### EXTRACTS FROM ANCIENT WRITERS ON THE EMPLOYMENT OF COMMON SALT IN AGRICULTURE, AND IN FEEDING CATTLE.

1. Pliny, the naturalist, seems to have known little or nothing of the use of Salt in agriculture; but he was well aware of its virtues in feeding cattle. "Herds of cattle," says he, "being covetous of a salt pasture, give a great deal more milk, and the same is much more agreeable in the making of cheese, than where there is no such saline ground."

*Pliny's Nat. Hist. book* 21, *chap.* 7.

2. John Glauber, an eminent chemist of Amsterdam, who published several esteemed works on the practice of chemistry about two hundred and fifty years ago, was so thoroughly convinced of the economy of using Salt as a manure, that he obtained a patent from the government of the United States of Holland for the sole disposal of the privilege of applying this valuable mineral to the barren lands in that country. The following brief extracts from his work, entitled "The *Prosperity of Germany*," will be sufficient for our present purpose.

"Salts of no great cost are to be had in vast quantity, with which, corn being macerated, and sown in barren lands, and in such as are not dunged, doth come to perfect maturity: and this I have tried not only once, but oftentimes; and have also proposed to bring it into public use in these united provinces: to which end the most Supreme Orders, general and provincial, have granted me a privilege or patent for many years; whereby it is forbidden to sow or plant barren, sandy ground after this kind of way without my consent. The main basis of the knack lies in Sea-Salt, which may be plentifully had in these places, to fatten lean and dry ground with instead of dung."—*English Translation in folio*, London, 1689, page 388.

3. John Jonston, a learned Polish naturalist and physician, who travelled over every kingdom of Europe, and was esteemed everywhere by the learned, has an entire chapter on Common Salt, in which he writes thus: "Also fields, whereupon Salt is sprinkled, become fruitful by it, as experience makes good. It destroys worms in animals." Jonston's *History of the wonderful Things of Nature.** The English translation, folio, London, 1657, page 94.

4. Gervase Markham, a learned writer in the reigns of James the First and Charles the First, who was equally noted for his skill in many foreign languages, and for his knowledge of the various branches of agriculture, published a great variety of treatises on the management of land,†

* He also published a "Natural History of Birds, Fishes, Quadrupeds," &c. in 1653, folio; also a work upon the Hebrew and Greek Festivals, in 1660; and some volumes upon other subjects.

† Markham, in 1616, published "Liebault's La Maison rustique," or the Country Farm, which sometime afterwards was translated into English by Dr. Surfleit. Besides this, he printed a book entitled "Cheape and good Husbandrie; also the Use and Profit of Bees, the manner of Fish-ponds, and the taking of all sorts of Fish." London, 1656. Another thin quarto, entitled "The Inrichment of the Weald of Kent, or a Direction for the true ordering and manuring all the Grounds within the Wealds of Kent and Sussex." London, 1660. And several other works, which were held in great estimation.

and closed his agricultural labours by the publication of a work entitled "*Markham's Farewell to Husbandry*," in which the following passages occur. "If you be neer unto any part of the sea-coast, thence fetch great store of the salt-sand, and with it cover your ground which hath beene formerly plowed and hackt, allowing unto every acre of ground threescore or fourscore full bushels of sand, which is a very good and competent proportion; and this sand, thus laid, shall be very well spread and mixed among the other broken earth. And herein is to be noted, that not any other sand but the salt is good or available for this purpose, because it is the brine and saltnesse of the same which breedeth this fertility and fruitfulness in the earth, choaking the growth of all weeds, and giving strength, vigor, and comfort, to all kind of grain or pulse, or any fruit of better nature."

"Now methinks I hear it objected, what if the ground do lye so farre within the land, that there is no salt-sand within many score miles of it, how then shall I make good my barren earth? To this I answer, that albeit this salt sea-sand be of infinite good and necessary use, inriching ground wonderfully much; but if your ground lye much within land, and farre from the sea, then to every acre of land you shall take two bushels of very dry bay-salt, and in such manner as you sow your wheat you shall sow this salt upon the ground; then immediately after the sowing of the salt you shall sow your wheat, which wheat would be thus prepared before you sow it. The day before you are to sow your grain, you shall take bay-salt and water, and mixing them together, make a brine so strong that it will bear an egge; then put the wheat you are to sow into that brine, and let it steep therein till the next day; then drain it from the brine and sow it; and no doubt but you shall find a marveilous great increase thereby. Neither is the thing itself without good and strong probability of much increase, and strength for the bettering of all manner of arable grounds;

for there is nothing which killeth weeds, quicks, and other offences of the ground, so much as saltness."

In chapter V. entitled "of the ordering of all barren clays that are over-run with ling or heath," after giving directions how to make and dress the land, he adds, "And if the ground have been sanded (with salt sea-sand) you may sow your seed-wheat simply of itself, without any doubt of the plentiful increase thereof; but if it have not been sanded, then you shall not only steep your seed in brine, but also you shall mixe your seed with bay-salt, and so sow it into the ground."

In the chapter which treats of the method of recovering such land as has been rendered sterile by the overflow of sea-water, Mr. Markham writes thus:

"In all my former relations, touching the bettering of ground, I do apply, as one of my chiefest ingredients, salt-sand, salt-weeds, salt-water, salt-brine, ashes, and many other things of salt nature, as indeed all the manures and marls whatsoever must either have a salt quality in them, or they cannot produce fruitfulnesse; so that it might be argued, if Salt be the occasion of fruitfulnesse and increase, then there cannot be much hurt done by these overflowes of the salt-water, that it should rather adde a fattening and enriching to the ground, than any way to impoverish it. But experience shews us the contrary, and that there is nothing more noisome and pestilent to the earth than the *superabundance* and too great excess of saltnesse, &c."

In the chapter on enriching of barren grounds for the growth of hemp and flax, he directs first to plough it, "then with the salt sea-sand you shall sand it very plentifully, but if that be not to be gotten, and you be very well assured of the natural richness of the earth, you shall then sand it with the best red sand you can find near unto you; and upon every acre of ground you thus sand with fresh sand, you shall sow three bushels of bay-salt, and then plough up again the earth, sand and salt together, which should be

done about the latter end of the yeare, as after Michaelmas, and so let the ground rest till seed-time, at which time you shall bring sea-weads to your hemp land, and cover it all over with the same, and then you shall plough it again, burying the weeds within the earth. As for the weeding of this ground, you shall not respect it at all, for *it will put up no weed.*"

In the chapter on vermin, Mr. Markham says. 'The next great devourers of grain are pismires or ants, which, although it be but a little creature, yet it is so laboursome, that the grain which they carry away or destroy amounteth to a great quantity. If you manure your corn lands with ashes or salt sand, you shall be well assured it will never breed pismires."

5. Sir Hugh Platt, a writer of some eminence in the time of Oliver Cromwell, states it to be his opinion that "it is Salt which makes all seeds to flourish and grow; and that no dung which is laid on barren ground could any way enrich the same, if it were not for the salt in it." See his "*Jewell House of art and nature.*" Folio, London, 1653, chapter 104.

6. Mr. Christopher Packe, the translator of the works of John Rudolph Glauber, and an eminent chemist of the seventeenth century, speaks very decidedly of the virtues of Common Salt in agriculture. Having made some observations on Mr. Glauber's processes for mixing lime and Salt, he proceeds to give the following directions respecting the mode of applying the Salt, which are quaint enough, but I shall give them in his own words.

"The lime," says he, "must be spread upon the ground where no rain can come to it, till it slake itself by the air, and fall into a powder. Of this powder you are to take four hundred weight to one hundred weight of any Common Foul Salt, which is too impure for the use of the kitchen, where such may be had, otherwise Clean Salt (for that will be *cheaper* than dung:) the Salt and lime are to be well

mixed, and then moistened with such a quantity of water as will bring the lime and Salt mixed to the consistency of a stiff mortar. Of this mass balls are to be made about the bigness of one's fist, and laid under a shed or hovel to dry; being dried, they are to be burnt in a kiln as lime is, so that the balls may be red hot for an hour at least.* When the balls are burnt, they are to be again placed upon a floor under a shed or hovel where they may be exposed to the air, but kept free from the rain, and if you break them with a clodbeater presently, the air will the sooner act upon them, and cause them again to fall into a powder, which powder may then be carried out and spread, or rather sowed out of a *seedlet*, thicker or thinner as the land shall require; which joining itself with the earth, is again attracted by the seed when it is sown, whose growth is thereby swiftly promoted, and its multiplication much augmented."

7. The great Lord Bacon, who flourished early in the seventeenth century, having noticed the advantages which the farmers of Cornwall, Devon, and other maritime counties, derived from the free use of sea-sand, which upon those coasts chiefly consists of broken shells impregnated with salt-water, declares that the best manure next to marle is sea-sand, which no doubt (says his Lordship) obtaineth a special virtue by the salt water, and concludes by affirming that Salt is the first rudiment of life.

*Nat. Hist. Cent.* 6, *Exp.* 596.

8. The eminent Mr. Evelyn, in his discourse on the effects of the overflowings of the river Nile, asserts, that "Salt is the vigour and close of all things; the first and last of all elemental bodies; the *quid divinum*, and original of all fecundity."

*Philosophical Discourse of the Earth, page* 103, *&c.*

* This direction for burning the mixture may have been consistent enough with the prevalent notions of the time, but the Salt would doubtless be equally efficacious without that operation.

9. The celebrated Anthony De Leuwenhoek, who was a Fellow of the Royal Society, in his observations on the storm which happened in the year 1704, when many of the banks of Holland were broken down and the country overflowed, addresses himself to his countrymen in the following manner:—"There are some," says he, "that affirm, that the scattering of this salt water by the storm will do a great deal of harm to the fruits of the earth; but, for my part, I am of a quite different opinion, for I believe that a *little* Salt spread over the surface of the earth, especially where it is heavy clay ground, does render it exceedingly fruitful; and so it would be if the sand of the sea were made use of for the same purpose."—*Philosophical Transactions, No.* 289. The year following, the Dutch had the largest crops of grass and of corn that had been known for many years before.

10. In the Philosophical Transactions, is a memoir by the Archbishop of Dublin on the manuring of lands in the counties of Londonderry and Donnegal, in Ireland, with sand and shells from the sea-shore, from which I extract the following passages. Treating of boggy land, he says:—"The turf is nothing but the product of vegetables, which rotting, there remains only the earthy parts: now shells being chiefly salt, the salt incorporates with the sulphur of the plants, and renders them fit for the vegetation of new plants, which further appears from this, viz.—that those shells which have been under the salt-water are much better than such as lie dry on the strands. Some thousands of acres have been improved by these shells, and what formerly was not worth a groat per acre is now worth four shillings. Some years ago they made lime of the shells, and manured their lands with it, but a poor man, who, from laziness or poverty, had not provided to make lime, threw the shells unburnt on his land, and his crop proved as good as his neighbours, and the second and third crop better; and all took the hint, and have used them so ever since.

Where shells are not to be procured, sea-wrack or sea-sand supply the want."—*Philosophical Trans. No.* 314.

11. Soon after the formation of the Royal Society, Dr. Bury delivered a memoir, containing an account of the manuring of land in Devonshire with sea-sand, which is much to our purpose. "Salt," says he, "quickens dead land, and is used in the south-west part of that county, which would otherwise be the barrenest, but is now the richest part thereof. The inhabitants go as far as the sea will permit them at lowest ebb, take the sand in bags, and carry it on horseback fourteen miles into the country, and spread it on the land, thereby improving it both for corn and grass. Crude Salt alone, if strewed upon the ground, does not improve but corrode it; the Sea-Salt is too strong and active of itself unless mixed with lime—how to mix them, Glauber directs."—*Philosophical Trans. No.* 316.

12. Dr. Cox, in his memoir, printed in the Philosophical Transactions, on the manuring land with sea-sand, writes thus: "The effect it usually produces where much of this sand is used, is, that the seed is much and the straw little. I have seen," says he, "in such a place good barley, where the ear has been equal in length with the straw it grew on. After the corn is cut, the grass, though it be but short, yet as to feeding, giving good creams, plenty of milk, and all other good purposes, far exceeding the longer grass, where less sand is used."

*Philosophical Trans. abridged*, vol. ii. page 730.

13. Dr. Plott, the author of the topographical histories of Staffordshire, Oxfordshire, &c. when treating of the husbandry of his own time, says:—"At Nantwich they yearly brine their fields, from which they find a more profitable return than from any soil or dung."

*Nat. Hist. folio, page* 39.

EXTRACTS FROM MORE MODERN WRITERS ON THE USE OF SALT IN AGRICULTURE.

14. "I am well assured from a Scotch gentleman, that they have long used Salt in that part of Great Britain, always sowing ten or twelve bushels by hand of their coarse Salt on an acre of young green wheat, sometime in November, December, January, or February, it being, from the several accounts which I have had of it, very effectual in the *killing of tender weeds* amongst corn, yet at the same time *cherishing the corn;* and though it does not add altogether to the bulk or height of the straw, yet it does much to the goodness and plumpness of the grain. And whoever has been curious in their remarks abroad will find that it is the usual practice of the Milanese to sow Salt on their pastures, as I have been informed by one who has sold great quantities for that purpose; as also by a merchant of Liverpool, who is well acquainted with that trade, who affirms that the finest crops they have of hemp and flax amongst the Dantzickers and others, who raise those commodities in those countries, are from lands on which Salt is strewed."—*The Practical Husbandman*, Octavo, London, 1733, vol. i. page 48.

15. "Salt certainly sweetens the grass much; and it may on all such occasions be mixed with a proper quantity of dung, which is more sulphureous than Salt, and will make grass shoot away much faster than any other manure. Lime in its own nature makes grass *sour*, but when mixed with Salt, that acidity will be taken away."—*Practical Husbandman*, vol. i. page 57.

16. "As to the proportion of Salt to be used on land, it ought to be according to the nature of it; cold, wet, clayey land requiring more, and loose soft land, though it be poor, requiring less. Again, the proportion of Salt ought to be either more or less, according to the crops of grass or grain

you would improve. For cold, wet, and spewy land, ten loads of dung, six of earth, and eight bushels of Salt, per acre.

"For lean, hungry, sandy land, fourteen loads of pond-earth, six loads of dung, and six bushels of Salt per acre when employed for corn and grazing.

"For meadow land, fourteen or fifteen loads of dung, five bushels of Salt, and four of pond-earth, the quantity of each to be altered according to the quality of the ground." —*Practical Husbandman*, London, 1738, page 59.

17. "Thus have I made out what I proposed, viz.: that every acre of land in England which was to be improved, may be done ten or twelve shillings an acre cheaper by Salt than any other way. Suppose then, that out of the forty millions of acres of land which are calculated to be in England and Wales, there is but one-eighth part, which is five millions, to be improved every year; and that one-half of those five millions may be manured by some other manure, there yet remains two millions and a half to be done by Salt still; which, reckoning the savings at ten shillings per acre only, (the expenses being about the same) comes to one million two hundred and fifty thousand pounds; which, if the old proverb be true, that so much saved is so much earned, then that sum is a real addition to the landed interest of Britain; and this calculation is not at all disagreeable to what is affirmed by some Cornish and Devonshire men, when they say that the money laid out in salt sea-sand, for the improvement of lands in those two counties, comes to thirty-two thousand pounds per annum." —*Practical Husbandman*, vol. i. page 63.

18. "On watering meadows with a solution of Salt, we are directed to make a large pit about twenty or thirty feet square, and five or six feet deep, more or less, as there will be occasion, in the method tan or salt pits are made, and put therein ten or twelve bushels of salt, and as much of lime, soot, or any other ingredient of that kind, and, having a pump near at hand, or some conduit or spring of wa-

ter, fill the pit up by degrees, at first to three or four feet high, letting the ingredients dissolve in the water, by being there twenty-four hours at least, stirring them sometimes about, and after that, by dipping in of the finger it will be found whether the water is salt enough (as near as you can to the strength of sea-water:) if it is not sufficient, then may be added a reasonable quantity more of the above mentioned materials; but if it be too salt, then more water may be poured in till it is just right and fit for use; and being possessed of a moving pump or a skip, pump the water into a hogshead, with a leather pipe, and a watering rose at the end of it, just as is practised in watering the streets in London, and so (having the hogshead placed on a roll) may both meadows and corn land be watered to a good advantage."—*Practical Husbandman*, vol. i. page 74.

19. "To shew an acquaintance of mine the effects and advantage of Salt properly applied to vegetables, I made the following experiment, in an extreme dry summer, upon a bare piece of pasture land, out of which the cattle were all taken for want of grass: I marked four places with stakes, each of which I watered nine nights successively, in the following manner:—the first with spring water alone, to the quantity of a gallon; the second with the same quantity of water, adding an ounce of common salt; the third and fourth with the same quantity, mixing the water in the third place with two ounces of salt; and that in the fourth with three ounces, which produced the following different effects.

The grass in the second place grew more and of a darker green than that in the first; in the third, it only grew by spots, for part of it was killed where the greatest quantity of water fell, and the fourth was quite brown for a greater compass than the third; by which it appeared that an ounce of salt in a gallon of water had a better effect than the water had alone; and that three ounces of Salt, mixed with a gallon of water, was more than the grass could im-

mediately receive; but the fourth place in the ensuing spring was the most fertile of them all."—*Treatise of Fruit Trees*, by Thos. Hitt, 8vo. Third Edition, London, 1768, page 17.

20 "Soils which are subject to the grub, and must be fertilized by common dung, which is a proper nest for the mother beetle to deposit its eggs, must be well impregnated with the brine of dissolved salt, after the dung is first cut up: two large hogsheads of salt will make brine enough for a dung pan of fifty feet square. This cure for the grub is a late discovery, for which I am obliged to a judicious planter, and which I have tried with success."—*From an Essay on Plantership by Samuel Martin, Esq. of Antigua.*

21. "Having tried Salt upon a small scale on a sandy soil, I can assert sixteen bushels to be a proper quantity for one acre. It gradually advanced in its effects to sixteen, and as gradually diminished to forty bushels when vegetation was destroyed. Twice only have I had an opportunity of buying a few tons of foul Salt, and used it both times on a barley tilth, sowing the Salt immediately after the barley. The event was perfectly satisfactory. The verdure of the spring exceeded any thing of the kind I ever saw; and the ripened appearance was whiter by many shades than I ever beheld. N. B. Salt is noxious both to weeds and vermin."—R. Legrand, Esq. *on Manures, in the Annals of Agriculture*, vol. v. page 149.

22. Some Extracts from a Pamphlet entitled "Hints to Country Gentlemen and Farmers, on the importance of using Salt as a general Manure." By the late John Hollinshead, Esq. of Chorley. 3rd edition, 1802.

"Salt," says Mr. Hollinshead, "will be found to be the cheapest, best, and most durable manure ever yet made use of: and for the readier distribution of this most excellent manure through the kingdom, the public and enterprising spirit of the nation has of late years provided very ample and cheap conveyances to almost any part of the country

which the gentleman and farmer can wish, by means of the numerous navigable canals, which are either finished or projecting in almost every direction. Salt may be laid on the banks of the *Staffordshire* canal at fourteen shillings per ton: from whence, by means of the Oxfordshire Grand Junction, and other canals, it will with the greatest ease be conveyed to any part of the south of England, at a very trifling additional expense.

"Suppose a farmer to live twelve or fifteen miles distance from any canal, navigable river, or part of the sea-coast (which in general, perhaps, will be found to be the greatest extent he can have to fetch it,) from whence he can import Salt for the benefit of his lands; even at that distance his team will fetch a load of Salt in one day, say at the expense of ten shillings; and with that team he will convey home one ton of salt; therefore, for fourteen shillings, the original price of the Salt, five shillings (more or less) for the freight by the canal, river, &c. and ten shillings for the carriage home, he lays in his own field manure sufficient for two acres and a half of land, at the small expense of one pound nine shillings. What a vast superiority in point of expense, this would have over all the manures now in use; for lime, dung, or marle, even where most plentiful, on account of their great bulk, cost more in the single article of cartage, without regard to the expense of buying, or digging for them, than the whole charge of salt when laid on the ground.* Besides, as so *small* a quantity of Salt in weight will serve for manuring lands, this is no inconsiderable recommendation, because on that account it may with ease be conveyed to the *most rough, steep, and mountainous* parts of the country, to which the bulky and heavy manures now in use could not be carried,

* This goes on the presumption of Waste Salt being allowed the farmer duty free; but even with the present duty, a ton of Rock Salt, containing forty bushels, may be put on board a boat on the canal for six pounds.—S. P.

but with infinite labour, and at an expense far exceeding all the advantages to be expected from it."

23. "That Common Salt is an excellent manure, experience, the most satisfactory of all evidences, clearly proves. It was used round Northwich, in Cheshire, as a manure, so long as foul Salt was permitted duty free, with very great success."

24. "Nothing in nature is so powerful as Salt, to meliorate and drain strong and stiff soils, and also to give moisture to dry ground: it is also a certain destruction to weeds and insects. Besides its efficacy on corn and fallow grounds, its excellent qualities in giving luxuriance and salubrity to grass lands are peculiarly worthy the attention of the grazier and breeder of cattle."

25. "When a farmer intends to fallow a piece of ground, he ought first to sow it with such a quantity of Salt as would be sufficient to *destroy* all vegetation, viz. forty bushels per acre;* which, by cutting and dividing the viscous substances which are in the earth, would reduce it into a proper state to become food for plants. The farmer must take notice, that this Salt is to be sown on the ground sometime before he begins to work his fallows with the plough (the autumn will be the most proper season,) in order to give the Salt sufficient time to destroy the grass and other roots upon it, before he begins to work it. The Salt being thoroughly mixed and incorporated with the soil, during the spring and summer following, whilst the land is on the plough, will, by the time the seed is sown upon it, be reduced to that strength which is the most proper for effectually and vigorously assisting and supporting vegetation while the seed is on the ground, and such lands will be

* I think it necessary to remark upon these directions, that I believe the writer is here, and in the former extracts, speaking of *foul* Cheshire Salt, such as at that time was allowed to be used for land. Therefore in using Rock Salt only half the quantities which he mentions ought to be employed.—S. P.

found to produce a crop superior to those under any other mode of cultivation.

"This method of sowing the intended fallows with Salt will, therefore, serve very much to lessen the labour of the husbandman in working his grounds; for the tough and adhesive clods and lumps which are generally so troublesome, especially upon clayey soils, will be so completely broken and dissolved by the operation of the Salt, as to give much less obstruction to the harrow at the first working.

"In deep, loamy, dry earth, upon which wheat has grown, after the crop is got in, the land should be ploughed, and lie in that state until the spring, when it must be cross-ploughed and wrought fine with the harrow, and planted with potatoes: as soon as the potatoes are covered with earth, then sow or spread sixteen bushels of Salt per statute acre upon them; and when they are dug up in the autumn, then sow a crop of wheat again, taking care to pick all the potatoes clean out, that they may not injure the wheat in the following spring by growing up amongst it. By this method of cultivation, a crop of wheat, and another of potatoes, may be produced alternately on the same ground *for ever*, instead of losing a whole year's produce, according to the old custom, whilst the land is in fallowing.

"For other corn lands sown in the usual way, after a spring ploughing, the best method will be to sow sixteen bushels of Salt per acre, immediately after the grain is covered in by the harrow; this, by meliorating the soil, destroying weeds and insects, and attracting moisture, will produce an abundant crop; and, by sowing ten bushels per acre *annually*, these lands will ever after be exceedingly productive.

"There is still a further advantage which is highly worthy the farmer's attention, which is, that by having constantly a plentiful supply of such a cheap manure, he can always keep his grounds in a condition fit to receive any kind of grain which he would wish to sow upon it, which at pre-

sent is far from being the case: for instance, if he now wishes to sow a crop of wheat, he cannot do it without lime or marle; if he would plant potatoes, it cannot be done without a large quantity of dung, which, if it is of his own producing, he will impoverish his other lands while he enriches this: if he buy it, it must be at an enormous expense, and also to the proportionate injury of the district from whence he procures it, where it ought to have been expended; and therefore, though it should enrich an individual, it will not be of the least advantage in a public point of view, which undoubtedly ought principally to be attended to in things of this nature. Also, when a person enters on a poor farm, unless he be possessed of a larger capital than usually falls to the lot of this useful class of mankind, with all the industry and management of which he is master, his lease, nay even his life, may be expired before he has manured one-half of his estate, and generally speaking, the parts which he first tilled will be reduced to their former poverty, before one-fourth of the farm has received any benefit.

"But if he were permitted the use of Salt, duty free, with a very moderate sum of money, he would have it in his power, in a few years, to bring his farm into the highest state of culture and fertilization; so that at all times he would be enabled to bring to market those articles, which his situation, or the particular necessity of his neighbours, pointed out as most beneficial to himself.

"Another considerable advantage would arise to the occupiers of small farms in particular, and especially those with large families, from manuring with Salt, as they would be enabled to raise, not only a much greater *quantity*, but also a much greater *variety*, of the common necessaries of life, from the same extent of ground. For example:—a man who rents a few closes of land, gets, perhaps, nothing but milk and butter from his little farm, whilst he has the most substantial part of the sustenance for his family (bread) to

buy generally at a high price. But give him Salt duty free, and he may pitch upon *one* field, which, with the assistance of this manure, will produce him abundant crops of grain annually for ever, whilst his other fields will remain unmolested, and, if also salted, covered with the most luxuriant and wholesome herbage for the use of his cattle. At present, if he ploughs at all, it must be in rotation, or, as the farmers term it, in *shifts;* and by that means he is constantly injuring his grass-lands.

"When salt is used upon pasture-lands, it may either be sown upon them in its simple neat state, after the rate of sixteen bushels* the acre, or mixed with compost, mud, or loamy earth; sixteen bushels of Salt to twenty loads of earth, and turned in the heap two or three times to incorporate it properly; this compost should be laid on and spread in the autumn."

26. "For meadow-lands we would advise the farmer to sow *six* bushels of Salt per acre, immediately after the hay is got in. This would be found peculiarly beneficial in hot and dry summers, and upon lime-stone and sandy soils; which, after they are mown, are often so much parched by the heat of the sun, that not only the eddish is destroyed, but also the crop of the ensuing year is very materially injured; but by sowing it with Salt, moisture would be attracted and retained, sufficient to assist vegetation so powerfully, as in a short time again to cover the face of the ground with grass, and by that means effectually to screen the roots, which would otherwise be too much exposed to the direct rays of the sun.

"It may, indeed, be said, that dung will answer the same purpose; in some degree it might, but dung cannot always be had, never in sufficient quantities: besides, if it could,

*I think it necessary again to caution the farmer against using this quantity of *pure* salt upon grass-land, as it would probably burn up the grass. The writer speaks all along of *foul* waste Salt, from the Salt Works, which was seldom more than one-third of it real Salt.—S. P.

this objection lies against it, that neat cattle will not eat the eddish after dung, consequently one valuable crop is lost to the farmer, which, if Salt were used, would be both productive and wholesome. Also, the hay, when put into the mow or stack, should be sprinkled with Salt on every ayer. When hay is housed soft, this should never be omitted, as it would prevent what the farmers call the *mow-burn*, and make the hay far more pleasant and nutritious for the cattle in winter."

27. "Mr. Beck, gardener in Chorley, has constantly made use of Salt in his garden for upwards of thirty years, principally upon his onions; and he has invariably found the Salt to exceed every other kind of manure which he could have used for the like purpose. His method is to sow the Salt immediately after the seed is covered in. But as he never had any thought of communicating his observations and experiments to the public, he took no care to ascertain the exact quantity necessary to be sown on an acre, and proportionably upon any smaller quantity of ground: yet he thinks, if he might hazard a conjecture, that he has not sown *less*, and probably *more*, (of waste Salt) than *sixteen* bushels per acre. One year, by way of trial, he sowed the usual quantity of Salt upon a plot of onions, *after* they had begun to shew themselves above ground, and the crop, so far from being improved, was entirely spoiled; from this he infers, that the experimental gardener, who may be inclined to make use of Salt, will do well to throw it on as soon as possible after the seed is sown."

28. "The only manure that can be procured in all places is dung (lime and marl being entirely local, and confined to certain districts;) and how insufficient it is to answer all the purposes of husbandry, need not here be insis ed upon, since it must be plain to the most superficial observer. Let us turn our eyes for a moment to the generality of breeding and grazing-farms, and see in what state

they are. The dung that can be raised from the produce of the farm is all expended upon a few acres of meadow-land, whilst the pasture-grounds are destitute of every kind of improvement. This is no idle speculation; for which way so ever we turn our observation, we shall find abundant proofs of the truth of the assertion—thousands and ten thousands of acres lying in the same state, with regard to any actual improvement that has been made in them, in which they came out of the Creator's hands, and must inevitably remain so, unless some other manures are introduced into practice, besides those which are now in use.

"What a misfortune to the dairy must this neglect of the pasture-grounds be! and this too is the ground upon which the occupier must principally rely; for it is well known, that during the summer months, whilst his cows are at grass, is the time in which he chiefly produces his butter and cheese; and yet this ground is entirely neglected. Whilst the demand for those articles is daily increasing, we are indifferent whether their productiveness be proportioned to that demand; by which inattention the price of those commodities has, in a few years, been doubled. And what shall bring them to their former price? *Manure these pastures with salt.* By this means we shall increase their produce two-fold, and consequently decrease the price of those necessaries of life nearly in an equal proportion. This would be an unspeakable advantage and comfort to the labouring poor, at the same time that it was enriching both the farmer and land-owner.

"I know some will say that there are many soils which cannot be improved. I deny the assertion. Let but the farmer be properly encouraged to make the trial, and I am convinced he will not find his labour lost. If our ancestors had always been indifferent to agricultural improvements, what must have been our situation at the present day? We might have lived upon the haws and berries of the field; for nature has not been so lavish in her gifts to

this country as to some others: few of the necessaries of life will thrive and flourish without the most unremitting industry. *By nature our apples are crabs, and our plumbs sloes!* but art and nature have changed the scene: and health giving exercise, properly directed, and duly encouraged, would bring the kingdom to an unexampled pitch of plenty and splendour.

"The proper cultivation of the soil is an object so peculiarly interesting to the community at large, that those who industriously attend to it are perhaps to be esteemed the most meritorious citizens of their country.

"Of such importance are the study and practice of agriculture in Scotland, that they have instituted a professorship in one of their universities; and it is much to be lamented that a similar institution is not introduced into our universities, as it would essentially tend to the promotion of this most important department of knowledge, so highly beneficial to mankind."

29. "It is proved by the general returns of the number of inhabitants in *England* and *Wales*, that there has been an increase of two millions (or nearly one-fourth of the whole) during the last century. Then, as population and manufactures are rapidly increasing, is it not of the utmost consequence that we should have a proportionate increase in the productions of the earth?

"With proper encouragement to and management in agriculture, I have no hesitation in affirming that the generality of land, in most parts of England, might be made to produce double crops in a very little time; and with the addition of salt as a manure, instead of importing corn from abroad, to the great disadvantage of the nation, we might make our own produce not only sufficient for home consumption, but also to supply the wants of our neighbours. I need not insist on the advantage to be derived from such an improvement, not only to the farmers, but to the public at large, for it is well known to every commercial man of

what importance it is that our merchants should always have it in their power to undersell their rivals in foreign markets: this, however, it will be impossible for them to do, even if there be no advance in the price of the raw material, unless by bringing down the price of provisions we proportionably keep down the price of labour. And no other mode can be adopted so likely to accomplish this most desirable end as the general use of Salt for manure.

"We shall just mention one thing more in support of what has been advanced respecting the benefits of Salt for manure, which falls within every farmer's notice, but which, probably, has not struck him in that light in which we are about to represent it. Cattle kept in a straw-yard, without any thing but straw for their sustenance, yield a poor light manure, little superior to natural soil; whilst cows or oxen feeding on good hay, assisted by corn, oil-cakes, or other invigorating food, produce manure of the best kind; thus the stronger the manures are impregnated with Salts, of more value they are."

30. "We have at least *seven millions* of acres of uncultivated land in this kingdom! What a loss to the community must this be! Here is ground sufficient, if properly cultivated, to furnish all the inhabitants of the country with bread, lying entirely waste, whilst they are paying a double price for the necessaries of life! Let us not neglect the advantages which providence has so kindly put in our power: the means of relief are within our reach, if we are not wanting to ourselves. If half the money that was necessarily and humanely spent during the late scarcity, in bounties on the importation of grain, had been laid out in inclosing waste lands, and giving premiums to farmers, I am convinced that in any future unfavourable season we should not be obliged to rely upon a scanty and precarious supply of grain from other countries, but on our own granaries at home, which have been well stored in a time of plenty by the wholesome produce of our native soil.

"If we turn our eyes to the empire of *China*, we shall there see the beneficial effects of a due attention to agriculture. The population, upon an average throughout that vast empire, amounts to the surprising number of three hundred inhabitants to every square mile; that is, nearly three times the population of this country; and yet these people are maintained in plenty, without any assistance from other nations. How this is accomplished, SIR GEORGE STAUNTON, in his elegant and authentic account of LORD MACARTNEY'S embassy to *China*, informs us. 'The whole surface of the empire,' says he, 'is, with trifling exceptions, dedicated to the production of food for man alone. Few parks and pleasure-grounds are seen except those belonging to the emperor. Little land is taken up with roads, the chief communication being by water. There are no commons or lands suffered to lie waste through neglect, or the caprice or for the sport of great proprietors. No arable land lies fallow. And whatever defects there are in the soil, it is supplied by mixture with other earths, by manure, by watering, and by careful and useful industry of every kind.' Let us copy after so useful an example.

"The present high price of Salt, encumbered as it is with heavy duties, is such as to prevent all attempts of the farmer to ascertain its real utility by experiments. In order to do away this inconvenience, we sincerely hope the legislature will take this matter into its further consideration, and repeal the duty upon Salt, as the only thing that can effectually promote the proper improvement of the country.

"The Salt Rock in Cheshire lies about thirty-six yards below the surface, in thickness from ten to forty yards; it extends twelve miles in length, and several miles in breadth: and throughout the whole district springs arise, which are made into Salt. This rock, together with those which are in Worcestershire, &c. are sufficient to supply the whole kingdom *for ever*, without any fear of their being exhausted; and, if properly applied, are a treasure far greater than the gold mines of Mexico and Peru."

31. "The following account we had from Mr. Thomas Sutton, of Middlewich, in Cheshire. 'About twelve years since I dug up,' says he, 'a quantity of earth out of a field where a new building was going to be erected, in which there was some appearance of Salt-springs, the water from which had oozed up through the soil, and left an incrustation composed of the particles of Salt upon the surface of the ground. This soil, together with the Salt contained in it, I mixed with horse-dung: after it had lain some time in the heap, I spread it upon a piece of meadow-ground, which has been mown ever since, without any other manure having been laid upon it; and the other part of the meadow has been manured in the usual way every second year, and yet is now in no better condition than that which was covered with the Salt and dung twelve years ago."—*Mr. Hollinshead's Hints to Gentlemen, &c.* Page 5—33.

32. "A farmer at Glasson, near Lancaster, has for some time been in the habit of carting Salt-water to put upon his dung whilst in the heap in the yard, before it was taken to be spread upon the ground, which he has found by experience very much enriches the dung, and makes it better manure. A great advantage might also be derived to the farmer from spreading sea-sand under and amongst the dung, whilst it is in collecting, during the winter, and also in the cow-house, stable, and yard, not only on account of the particles of the Salt contained in it, but likewise by its retaining and absorbing the urine of the cattle, which is itself a very excellent manure."

"A farmer in the county of Sussex, some years ago, had a field, one part of which was very wet and rushy, and the grass produced upon it was of so sour and unpleasant a kind, that the cattle would not graze upon it: he tried several methods to improve it, but to little purpose; at last, having heard of the benefits of Salt as a manure, he determined to try that; for which purpose he procured a quantity of Rock Salt, which in a random way, without any

regard to the precise quantity, he threw upon this rushy ground, fencing it off from the other part of the field; the first effect of which was a total disappearance of every kind of vegetation. In a short time after, however, it produced the largest quantity of mushrooms ever seen upon an equal space of ground in that county. These in the spring following were succeeded by a most plentiful and luxuriant crop of grass, far exceeding the other part of the field in the richness of its verdure and the quickness of its growth: the cattle were remarkably fond of it; and though the Salt was laid on it *upwards of twenty years ago*, this part is still far superior to the rest of the field."—*Appendix to Mr. Hollinshead's pamphlet*, page 33—35.

33. Mr. Wedge, in his agricultural survey of the county of Chester, says, "foul Salt is a most excellent manure, either for pasture lands or fallows: and it is much to be regretted that so large a quantity as seven or eight hundred tons should annually, in Cheshire alone, be lost to the community. The heavy duty laid upon refuse or dirtied Salt prevents its use for manure.

"A difference of opinion," continues he, "having been entertained as to the utility of Salt as a manure, we insert the following experiment, which we have been favoured with by a gentleman of Northwich: In a meadow, where the after-grass being of a coarse, rank nature, which the cattle refused to eat, Salt was laid upon a part of the meadow, and the cattle have ever since preferred the grass growing on that ground to every other part of the field, and eaten up every blade. He also states that the good effects of Salt are particularly seen by mixing it even with the coarsest manure, and then laying it upon the land."

34. The late Thomas Butterworth Bayley, Esq. who was a Fellow of the Royal Society, and honorary member of the honourable Board of Agriculture in London, in his "Thoughts on Manures," after enumerating nineteen different substances which improve land, adds, "There is ano-

ther source of improvement LOST TO THE COUNTRY, but *not through the fault of the farmers*, viz. refuse rock-salt, and refuse liquor from the salt-works. I trust the very impolitic restriction which forbids the use of this valuable manure, and causes its *total loss*, will soon be removed by the exertions of this Society and those of the Honourable Board of Agriculture."—*From an Address read to the Members of the Agricultural Society of Manchester, October* 22, 1795.

35. "Salt is the mother of all manures, as every kind of manure is higher or lower in value according to the Salt it produces; and every kind of manure is portioned out to the land according to the quantity of Salt or nitre it is thought to have in it. Formerly, Salt was thought to be an impoverisher of land, but experience has taught us wisdom: it is now found to be otherwise, provided it is duly proportioned to the state the land is in, and mixed to molify it as follows: take ten bushels of Salt, and six bushels of dry ashes, and mix all together; then spread them on the land, and harrow them in with the seed: this is a sufficient dressing for an English acre, as it is better to repeat the dressing than to lay too much on at once. By being thus mixed, one particle incorporates and mollifies the other. Salt itself is rather too severe and harsh in its nature, and if laid too thick on, might prove of bad consequence; but if conveyed into the earth by a soapy, smooth method, will prove the real enricher the earth wants to send forth vegetation: this dressing will last for three crops. Sea-weeds, shells, fish, sea-water, sea-sand, have in them a proportion of salts, and, therefore, must be esteemed a manure."—From C. Varley, Esq. *communicated to the Chester Chronicle by the Rev. B. Dacre of Mosely, near Manchester.*

36. "After draining a piece of sour rushy ground, about the middle of October, some refuse Salt was spread upon a part of the land, after the rate of eight bushels to the acre, and in another part sixteen bushels. In a short time the vegetation disappeared totally; and during the month

of April following, not a blade of grass was to be seen. In the latter end of the month of May, a most flourishing crop of rich grass made its appearance on that part where the eight bushels had been laid. In the month of July, the other portion produced a still stronger crop; the cattle were remarkably fond of it, and during the whole ensuing winter, (which is ten or twelve years since) and to this day, the land retained, and yet exhibits, a superior verdure to the neighbouring closes.

"A gentleman lately carried a small quantity of couch-grass roots and other rubbish harrowed off his land, to the Salt Works, and laid it for some time upon the ground, where the foul Salt, by the direction of the officer, is destroyed; he then carried it back, and mixed it with other manure. His barley and his hay-grass were strong from this composition, beyond his most sanguine expectations.

"Its effects on fallow-land are equally advantageous. By sowing it at the time of breaking up the lands for a fallow, its strong saline quality destroys vegetation and every noxious insect; but by being mixed sufficiently with the soil before the wheat is sown, it adds a strong nutriment, and ensures the best of crops."—Dr. Holland's *Agricultural Survey of the County of Cheshire.*

37. The following impressive expostulation is said to be from the pen of the Right Honourable Lord Erskine.

"The science of agriculture is by no means at its height; and in the almost miraculous advance of chemistry, new means may be found from the concentration of known composts, and the discovery of new, to lessen the cost of culture, and to increase its returns. But here again your revenue stalks like a ghost across my path, whichever way I turn; as otherwise you have a superior unbounded source of improvement trodden under your very feet, and cast as refuse into your rivers, beyond all that chemistry is ever likely to discover. You have SALT in endless abundance, but your *necessity* turns it into *money*, even to forty times

its value, instead of spreading it abroad for various uses, to rise up in property which no money could purchase.

"Do you know what salt alone would do for you? Can you be so ignorant as not to know, that by taking the tax upon it *directly as money*, you rob yourself of fifty times its amount in the production of your soil; in your fisheries and manufactures; and in the universal prosperity of the country?

"Lime, which has caused to start into life the most inert and steril parts of Great Britain, is just nothing as a manure, when compared with SALT, which differs from it besides in two remarkable qualities, decisive of its superior value.

"Lime, and I believe all other known composts, are powerful only according to the quantities in which they are used; whereas Salt to be useful must be sparingly applied; it *corrupts* vegetable substances when mixed with them in *small* quantities, but *preserves* them when it *predominates in a mass*. It is needless therefore, to add, that, independently of its comparative lightness, the expense both of the article and its carriage must be very greatly diminished. Yet you rob the mother of your people of this food which indulgent nature has cast into her lap, sufficient, as you will see hereafter, to feed all her children, even if their numbers were doubled."—*Armata*, part 1. page 169.

38. "Salt answers best as a manure for green crops, especially for turnips and clover. It is not of much benefit to barley or wheat, if sown; but in compost it proves very advantageous; using thirty Cornish or forty-five Winchester bushels per Cornish acre, which is larger than the statute acre, nearly in the ratio of six to five. Prepare the ground for turnips, and sow the Salt a fortnight before the seed, or longer, if a larger quantity of Salt is used."

Mr. Seckler, at Henver, in the parish of Gwinear, has just applied Salt in the above proportion to poor exhausted land; being clay, inimical to turnips: the effect has been a heavy, rich crop, which I have had an opportunity of

seeing. It is such a one as a hundred tons of dung per acre would scarcely produce in the same land. The Salt employed is that which is considered refuse, after having cured the fish, and been condemned by the excise. Over this they throw some dirt, and it is then sold to the farmers by the fish-curers. If the duty were taken off Salt, for every bushel now used there would be at least a hundred bushels employed for this purpose. It has been said that the value of refuse Salt, as a manure, depends upon the soil and animal matter which adheres to it; but the farmer knows from experience, that that Salt is to be preferred which has cured only one bulk of fish; and they give a higher price for it than for that which has been twice employed, and which consequently contains more animal matter. Where an estate has been salted for two or three crops, the effects are visible for at least seven years. It has a particular tendency to convert poor and light soils into firm and adhesive ones, 'giving them body.' Among the farmers there is a general scramble for the refuse Salt, to try who can get most of it by purchase.

"The following curious anecdote may be related as serving to illustrate the effect of Salt: Mr. Seckler made a little heap of earth in the midst of a field, on the top of which a cart load of refuse Salt was thrown; the earth in the heap itself, and (after its removal) the earth under it, for upwards of two feet deep to the clay, was rendered so perfectly barren, that the most common weeds would not vegetate in it. This barren earth, however, furnished the richest dressing for the remainder of the field. Mr. Seckler found Salt the best preservative against the mildew in wheat. When the wheat followed turnips with Salt, it escaped the mildew which attacked other fields which were not salted; and this he finds to hold universally good, as far as his experience goes. The improvement of bad hay, by Salt applied in the proportion of about one hundred

weight* to three tons, and sprinkled between the layers, is very striking, preventing mildew, and rendering it more grateful and beneficial to cattle, especially if the hay is bad: and even in good hay it is very greatly ameliorated. A testimony in favour of the benefit of Salt is furnished by the striking fertility of the land in the neighbourhood of the sea-shore in Cornwall; more especially in those situations which are favourable to the general distribution of the saline spray, as is exemplified in the parish of Fennor."—Sir Thomas Bernard's *Case of the Salt Duties*, page 272, *communicated by Dr. Paris, late of Penzance*, but now of Dover Street, London.

39. "Notwithstanding the excessive duty, numerous experiments have been made, and almost invariably with uniform success. An interesting detail from the Rev. E. Cartwright will be found in the fourth volume of communications to the Board of Agriculture, which is conclusive, as to the application of Salt as a manure for potatoes. It appears from this communication, that the experiment could not have been tried on a soil better adapted to give impartial results. Of ten different manures which were resorted to, most of them of known and acknowledged efficacy, one only excepted, *Salt* was superior to them all. Its effects, when combined with soot, were extraordinary, yielding in a row two hundred and forty potatoes, whilst one hundred and fifty only were produced from the row manured with lime. It was observable also, where Salt was applied, whether by itself or in combination, the roots were free from that scabbiness which often infects potatoes, and from which none of the other beds (and there were in the field near forty more than made part of the experiments) were altogether exempt. And in Dr. Holland's Agricultural Survey of the county of Chester are clearly

* This is foul fishery Salt: of pure Salt, a third of the quantity might be sufficient.

shewn the good effects resulting from its use on grass lands, and as a manure for wheat and barley. In the twenty-seventh volume of the Annals of Agriculture, there is a communication from Davies Giddy, Esq. of some interesting experiments on the use of Salt in the culture of turnips; by which it appears, that on a part of a field, which had been previously exhausted, half a crop of turnips was produced: but the crop totally failed in that part of the field where the ordinary manure was laid *without* Salt. In another instance, three acres of land, which in the preceding year had borne a crop of wheat, not exceeding twelve bushels on an acre, were ploughed before Christmas, and brought into fine tilth by the Midsummer following. On each acre were sown twenty bushels of Salt, excepting that two ridges towards the middle of the field were purposely left without it: on these two ridges the turnips totally failed; but the remainder of the field produced a plentiful crop. It is farther instanced, that four acres of land, completely worn out by successive tillage, were ploughed before Christmas; three acres were sown with Salt, at the rate of twenty-five bushels, and the remaining acre with eighteen bushels, without any other manure: the crop was in general a good one, but was visibly the best where the greatest quantity of Salt had been used. Crops of turnips were subsequently raised with equal success; and in the severe winter of 1794-5, it was much less injured by the frost than others similarly treated and cultivated in the common way."—*Letter to the Right Hon. Nicholas Vansittart*, by *William Horne, Esq.*

40. "Sea-sand is very generally used in the county of Cornwall for manure, and the quantity which is every season carried away from different parts of the coast for the purpose of manure almost exceeds belief. From Bude, in the parish of Stratton, it has been ascertained that in one day as many as four thousand horse-loads have been taken; and from the harbour of Padstow, it has been computed,

that fifty-four thousand cart-loads are annually carried The expense of land-carriage for sand, used in the county, has been considered as amounting at least to thirty thousand pounds annually."

"That the beneficial operation of this sand depends upon the presence of calcareous matter there cannot be any doubt, but, at the same time, we are borne out by unequivocal facts, in believing that the Sea-salt, with which it is impregnated, contributes materially to its fertilizing powers."—Dr. Paris's *Memoir in the Transactions of the Royal Geological Society of Cornwall*, vol. 1. 8vo. London, 1818, page 193.

## AGRICULTURAL INTELLIGENCE.

ROXBURY, JUNE 8, 1825.

### COMPARISON OF THE PRESENT SEASON WITH FORMER ONES, AND THE AGRICULTURAL PROSPECTS OF THE YEAR.

FREQUENT accounts of the state and progress of vegetation are interesting to farmers. They are interesting by enabling us to compare one portion of the country with other parts—and by affording early information as to the failure or abundance of crops, they may influence our sales of produce, and even our cultivation. If, for example, it could be ascertained in June, that there would be a short crop of hay, it might induce farmers to try millet, which may be sown early in July, and yield an abundant supply of fodder, or to increase their quantity of root culture. There is also pleasure, if not profit, in comparing one season with another. Those who come after us, also, will have the means of ascertaining whether any material changes have taken place in the climate either for the better or worse. It is well known, that the past winter of 1824–5, was,

throughout the United States and Europe, an unusually mild one—and few springs ever opened earlier or under more auspicious prospects. This character of unusual earliness it still retains, and we have reason to be grateful, that it has not been followed by late frosts, fatal to fruits and to tender cultivated vegetables. The flowering, or as it is technically called, the blossoming of all sorts of fruits was most abundant, and even the more delicate sorts, and all the hardy ones, have set well. If there is any danger, it is that of an *overloading* of the fruit trees, a circumstance not so much regretted as it ought to be. This overbearing is alike hurtful to the tree and to the quality of the fruit, and the European cultivators so fully understand this, that it forms no unimportant part of their care to mitigate the evil by taking off one half or two-thirds of the fruit in an early stage, in very abundant years.

The prospect of grass on the 1st of May was very fine. The winter had killed none. It sprung up very thick, and promised well—but a drought through the whole of May, and the first days of June has, it is believed, materially and essentially injured the crop. A drought in any latter month is not half so fatal. On dry shallow soils, and on old fields, the crop will be lessened from one third to one half. The late refreshing rains of the 5th and 6th of June cannot save the crops on early and dry lands, though they will much increase the crop on other soils, and thus diminish the evil. Hay, however, promises to be a dear article the next year as it has been the last.

*Full comparison of the present Season with several former ones, so as to enable our readers to make an average.*

FLOWERING OF VARIOUS PLANTS AND EARLY GARDEN PRODUCTS.

Apricot opened its first blossoms in 1815, May 1; in 1816 April 29, in 1822 April 21, in 1823 April 20, in 1825 April 11, nine days earlier than the earliest season enumerated.

Cherries opened their first flowers in 1813 May 18, in 1815 May 10, in 1816 May 6, in 1822 May 1, in 1823 May 7, in 1824 May 1, in 1825 April 23, seven days earlier than the earliest season.

Pears opened their first flowers in 1813 May 20, in 1815 May 20, in 1816 May 12, in 1822 May 5, in 1823 May 3, in 1824 May 4, in 1825 April 30.

Apples opened their first flowers in 1813 May 23, in 1815 May 25, in 1816 May 12, in 1822 May 9, in 1823 May 19, in 1824 May 11, in 1825 May 8.

Asparagus first cut in 1813 May 14, in 1815 May 6, in 1816 May 5, in 1822 May 1, in 1823 May 5, in 1824 April 28, in 1825 April 20.

Green Peas first gathered in 1813 June 19, in 1815 June 21, in 1822 June 6, in 1824 June 11, in 1825 June 5, were fit June 3.

These items are not one half of the variety of plants to which my notices and records extend, but they are sufficient to show that this season is the most early we have had for a great number of years. It is to be remembered, that we always refer to the same individual trees every year without which the comparison would be idle. In some estates the same sorts of fruits might flower a week earlier or a week later, but by constant reference to the same tree you obtain the true state of vegetation for the season.

A FARMER.

Admiral Sir Isaac Coffin, whose munificence, and of whose zeal to promote the interests of his native state we have repeatedly had occasion to take notice and to commend, has, with untiring generosity, added another favour to the cause of Agriculture. He has ordered a stallion and mare of the Cleaveland Bays, and he insists upon sending them out free of any expense to the Massachusetts Society for promoting Agriculture, except freight. We have seen the correspondence between the Admiral and his friend the celebrated breeder of short horned cattle and of the Cleaveland Bays, Mr. Wetherell, which confirms the opinion we had before of the liberal spirit of the Admiral. Mr. Wetherell tells him "he has no horse of proper age; that such an one would cost from £200 to £300 (from 900 to 1400 dollars)—that he has 2 year old colts, very fine, which could be had for 500 dollars." The Admiral replied "You are a better judge than I am whether the 2 year old colts will stand the voyage. I wish to have the best at any rate —my design being to benefit my native state, a few hundred dollars one way or the other would not be considered as of moment."

The Cleaveland Bays, are, we believe, derived from a cross of the English hunter with the Hanoverian or Flemish heavy mares;—we are not, however, certain of this fact. They are a large race of horses, very celebrated for the carriage—remarkable for activity, (considering their size) strength, and hardihood. Such, at least is the character given of them by British writers. Their colour uniformly bright bay—their figures showy, and their carriage and gaits noble. They are exactly calculated for coaches, and our new four-wheeled *one-horse* carriages, which the French, fond of ridicule, call "demi-fortunes"—or *half fortune* carriages.

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